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MODEL Airplane NEWS

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MODEL Airplane NEWS

MAY 2001 • VOLUME 129, NUMBER 5

p. 32

ON THE COVER: *Chris Chianelli brings the Yellow Aircraft Sukhoi SU-31M in for a low flyby for the camera. This ARF model is easy to assemble and has great flight characteristics. Inset: the XF631 is the latest in the JR line of programmable transmitters; check out Bob Aberle's review on page 100.*

Features

Construction

Field & Bench Reviews

Columns

Departments

Gearing up

There are many advantages to equipping a model with retractable landing gear: retracts reduce drag while increasing performance, and they complete the package for many scale models. In this issue, author Joe Felice explains the installation, operation and maintenance of retracts, including pneumatic, mechanical and electrical gear. If you've ever admired models that could pull up their gear but thought that installing retracts was too complicated, Joe's article is a must-read. Turn to page 38 and see how easy it can be to outfit your models with retracts.

Shailesh Patel and his 50-pound, 8-foot-span F-86 at the Superman Jet Rally.

SUPERMAN FLIES AGAIN

Contributor Rich Uravitch attended the 12th annual Superman Jet Rally in Metropolis, IL—one of the premier jet events in the Midwest. On page 32, he reports the newest innovations and developments in the world of jet modeling, including the upcoming flight test of Jim Weigle's 21-foot-long Concorde!

IN THE WORKSHOP

In "How to Strip-Plank like a Pro," author Henry Holcomb shares the secret to easily creating light, strong structures using only a balsa stripper, balsa and glue. Also this month, Jef Raskin takes the guesswork out of balancing your model by providing some very simple equations that you can plug into your calculator or computer spreadsheet. This is a formula for success!

"HINTS AND KINKS" RETIRES

For the past 26 years, Jim Newman's "Hints and Kinks" has been a mainstay of *Model Airplane News*. With this issue, we toast Jim's retirement from his column and look forward to his future contributions to the magazine. With his last column, Jim included a letter to his readers, excerpted below:

"Thank you to the readers who often brightened my days with a little note and a compliment or two. I hope my humble efforts have been of some use to you. It has been a wonderful trip. Readers, I want you to know that this was not my column; it was—and always will be—yours; I merely drove the pen. Without your ideas to share with other modelers, there would have been no "Hints and Kinks" all these years. So keep your eyes on the horizon, stay out of rough weather and always land safely."

Jim, although we will greatly miss your monthly column in *Model Airplane News*, we look forward to the projects and special assignments that your retirement will allow you to undertake. It would be difficult for us to point to any other contributor over the last quarter century who has been so reliable and knowledgeable. On behalf of all of us who have worked with you over the years, thank you for your countless contributions, support and friendship.

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FOUNDED 1929

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AIRWAVES

Our readers write back

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA; man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous number of letters we receive, we cannot respond to every one.

.40 ENGINE SHOOTOUT

Dave Gierke's write-up in the March 2001 issue is terrific, and it clearly involved a tremendous amount of hard work.

One of the things I've always felt about plain-bearing engines compared with more sophisticated engines is that in the latter, the extra sophistication seldom pays for the extra weight. As a consequence, simpler, cheaper engines often have a higher power to weight ratio than ball-bearing ones. I've taken Dave's figures and calculated torque/ounces of weight, and his figures confirm what I've often thought. The top two engines in this respect are the Tower .40 and the Thunder Tiger GP-42, at 6.1 and 5.6. The bottom one is the SuperTigre GS .40 at 4.7.

I think the tendency to use high-performance engines is more frequently seen where there is a limit on displacement in competitive situations—like when setting speed records—and other similar racing situations and pattern flying when there is a displacement limit. Sport and scale fliers really need the best power/weight ratios, regardless of displacement. It's like the old Detroit maxim: there's no substitute for cubic inches!

So why would we ever go to the complication and cost of ball-bearing engines when the simpler and cheaper plain-bearing engines really give better performance absolutely as well as better performance per dollar? And if we need more power, we can just go to a larger displacement.

Thanks for the best article on the subject I've read. It answers all the questions that anyone could ever have in this area.

ALAN C. BROWN
Watsonville, CA

How did Dave Gierke make his dyno? I assumed that the photo of the "break-in" stand and the dyno were switched in the article, but I couldn't figure out how the torque was measured. [email]

RICHARD OUTTRIM

Richard, yes; the photo captions were inadvertently swapped in the article. The dynamometer in question has been in development since 1969 when I decided that I needed to improve my engine performance for RC pylon racing.

Currently, I measure torque by voltage. I'll explain: the engine and its mount are attached to a rotation rod that allows the assembly to have a limited rotation within two ball bearings contained in pillow blocks. At the opposite end of the mount, a pendulum weight is attached to the rotation rod; it offers resistance to the rotation generated by the engine's torque reaction as it's running.

By attaching a plywood calibration wheel to the pendulum end of the shaft (it has a string wrapped about its circumference and ends at a weight container), I can determine torque by adding weights of known value and multiplying this by the known radius of the wheel ($T = F \times r$). To make things simpler during a test, I've wired a potentiometer in series with a battery, and the voltage is monitored by a digital voltmeter. The pot's output shaft is "geared" to the rotation rod by a loop of Kevlar string (similar to that of an old-time radio tuner), so its motion is increased about 3:1. Therefore, as the engine's torque reaction rotates the rod—finding its static equilibrium point—the pot indicates the rotation as a change in volts. Later, I convert this change to torque. I use 36 volts DC because it gives me a good voltage difference per unit of torque, especially with small engines that have limited output; other voltages work well also.

This whole thing sounds more complicated than it actually is. I've had many requests for information on the dyno, so I'll detail its fabrication and operation in Volume 2 of my book, "Two-Stroke Glow Engines," which should be published sometime in 2003.

DAVE GIERKE

MICRO ELECTRIC RC

Quiet, simple electric power for small models has become practical, and the size and weight of radio systems has shrunk dramatically. Slow, quiet, lightweight RC models have become practical for the first time.

For those who, out of curiosity or necessity, may be interested in this new light RC stuff, our club, the DC Maxecutors, has found some things that work pretty well. Practical and affordable airborne RC plus electric motor systems that weigh a total of 2.5 to 3.5 ounces are now available and can provide 5 to 10-minute flights.

This micro gear works nicely in 4- to 7-ounce models that have wing areas of between 140 and 300 square inches, with wingspans of 24 to 36 inches. The resulting wing loadings yield nice, slow flight capability; pretty easy to fly in fairly restricted areas.

Many kits and free-flight designs are suitable for conversion to micro RC, including most of the new Dumas and many of the older Guillow, Seaglen, Comet and Megow kits. And, when they're scaled up 2 to 2.5 times, most of the great free-flights, like Walt Mooney's Peanut designs, have proven to be excellent electric RC subjects.

Successful conversions we have seen include: Guillows 24-inch Nieuport 11 and 24-inch SE-5 kits; Golden Age Seaglen 30-inch Cessna C34 kit; Hurst Bowers' Lincoln All-Purpose and Velie Monocoupe (scaled to 30-inch span); Mike Midkiff's Junkers and Brewster Buffalo; and my 30-inch Handley Page W8b, 26-inch Dornier Libelle, 30-inch Blériot Canard and 36-inch Grumman Skyrocket.

One combination of radio and motor components we have successfully used is a GWS 7g, 4-channel receiver, Hitec HS-50 servos, FMA Mini 5 or Castle Creations Pixie ESC, Dymond M-1 motor and 7-inch prop (30 grams) and 6 to 8 Double-Time or Quad-Time NiMH cells (depending on power and flight time wanted).

Mini electric RC is enough like rubber free-flight scale to capture at least some of its wonder and nostalgia. I almost enjoy seeing my Handley Page twin-motor biplane do touch-and-go's off the school parking lot as much as watching it turn in a free-flight "max." And as the open spaces shrink and legs tire, for some of us, this little RC stuff can be pretty darn good.

DON SRULL
McLean, VA

Thanks for sharing your practical advice, Don. Readers who wish to learn more about the possibilities of micro RC should check out the RC MicroFlight *website at www.rcmicroflight.com.* DS

AIR SCOOP

BY CHRIS CHIANELLI

New products or people behind the scenes: my sources have been put on alert to get the scoop! In this column, you'll find new things that will at times cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

Super Detailed Giants

You're looking at two of the new generation giant-scale ARF warbirds from GiantScalePlanes.com. These beauties come finished just as you see them here. They are made with detail molded right into the glasswork. Balsa-sheeted foam-core wings have molded-in spars. All surfaces, including flaps, are shaped and ready to hinge, and precut retract bays accept Robart mechanisms. The AT6 has a 102-inch wingspan, whereas the Mustang's is 98 inches. Both models retail for $875 in a limited-production run.

GiantScalePlanes.com, 201 S. 3rd St. & Rt. 309N, Coopersburg, PA 18036; (610) 282-4811; giantscaleplanes.com.

Wingo Porter

This is Hobby Lobby's twin version of the hugely successful Wingo—dubbed the Wingo Porter. Personally, I'd call it the "Twingo." The name "Porter," however, does also fit because it was designed to carry stuff aloft—fun stuff like the Junior Jumper you also see here.

Powered by two Speed 400 motors, 4.9x4.3 Wingo props are driven directly. Props and motors are included in the kit. The Porter can be assembled in about four hours owing to ready-to-use, injection-molded foam parts. Twin power notwithstanding, this one can be flown by beginners; experts, however, will appreciate its fast climb.

The Porter features NACA4408 airfoil, one-piece fuselage, aluminum tail boom, quick-replacement motor battery and big Wingo wheels for grass-field operation. The payload compartment is at the center of gravity for simple hauling. Specs: wingspan—51 in.; wing area—480 sq. in.; flying weight—approximately 44 oz.

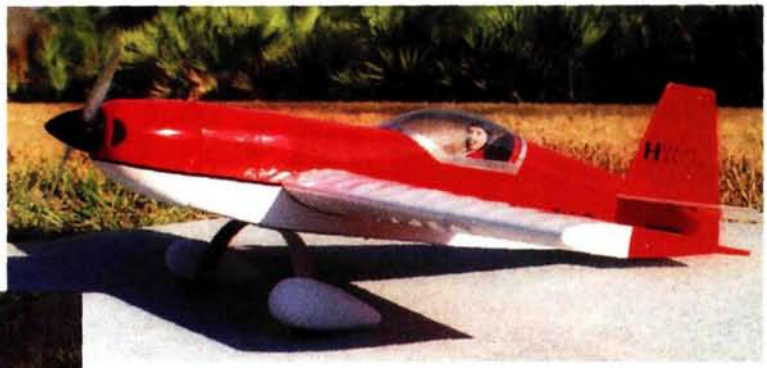
If the Porter interests you, also take a look at Hobby Lobby's new Kavan Junior Jumper. This RC parachutist not only free-falls and a chute opens, but it also features guided flight—all of which is also radio controlled! Just drop Junior from your Wingo Porter, and use a second RC unit to control him. The parachutist requires a 2-channel radio with control sticks for left/right and up/down (yes, you can flare him out for landings!).

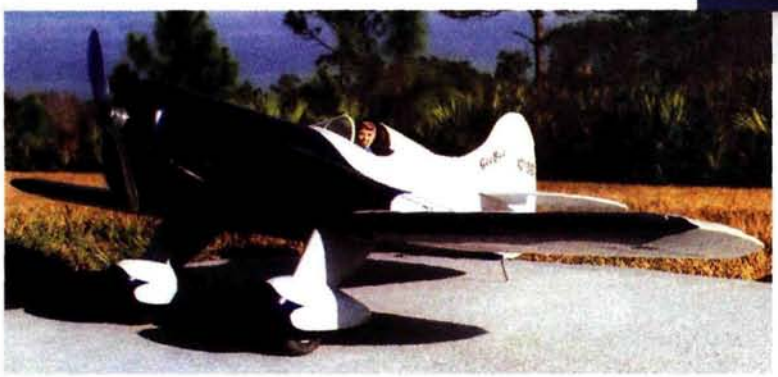
Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN, 37027; (615) 373-1444.

HOBBY HANGAR

Mini Edge 540 & G.B. Model "D"

The Edge and G.B. Sportster join Hobby Hangar's line of all-wood, laser-cut kits designed and produced for the sport/scale modeler. Kits consist of precision-cut balsa and hardwood parts, complete hardware package, vacuum-formed plastic parts, full-size plans and photo-illustrated instruction manuals. Edge specs: wingspan—41.7 in.; area 205 sq. in.; weight—19 to 24 oz.; power—.05 to .10 2-stroke. GB Sportster specs: wingspan—41.7 in.; area 326 sq. in.; weight—42 to 48 oz.; power—.25 2-stroke or .26 to .30 4-stroke.





Hobby Hangar, 7715 Industrial St., W. Melbourne, FL 32904; (321) 727-8227.

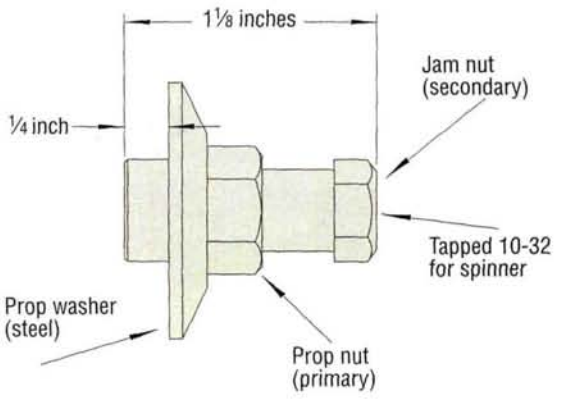
New Glue

There's a new glue company on the block called Cyberbond. It offers everything CA related: Thin, Medium, Thick, No Odor (thin, medium and thick); Ultra Fast, Ultra Flex; accelerator; remover. You name it; they have it.

Cyberbond, 401 N. Raddant Rd., Batavia, IL 60510; (630) 761-8900.

4-Stroke Adapter Kits

We 4-stroke lovers often run into problems with the short shafts found on some engines and the thick hubs found on props that are most appropriate for 4-stroke-engine use. This is especially true when a spinner is involved. I've seen some modelers forego use of a safety jam-nut to overcome the problem—something you should never do. Four-stroke engines should always run with a jam nut in place. Tru-Turn now offers an extensive line of what it calls Short-Shaft Double Jam-Nut Adapter Kits, for O.S., YS, Saito and other brands of 4-stroke engines.



Tru-Turn Precision Model Products, P.O. Box 836, South Houston, TX 77587; (713) 943-1867.

The Somethin' Extra . . .

. . . is now somethin' extra easy

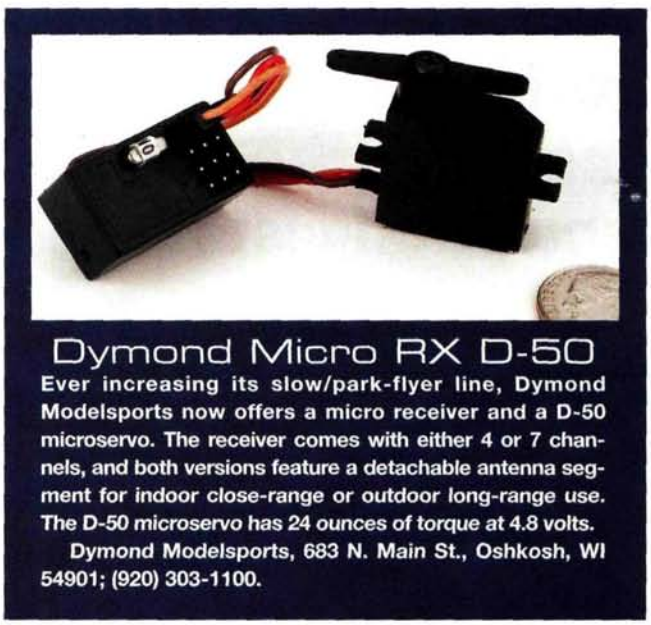
Sig's Somethin' Extra is very popular with hot-dog sport pilots—so popular, in fact, that Sig decided to offer an ARF version in the two Oracover color schemes that you see here. This new ARF version features all-wood construction; installed pushrod tubes; installed motor-mount blind nuts; and covered and slotted control surfaces. The kit includes wheels, spinner, tank, motor mount and complete nylon and metal parts package. Specs: wingspan—51.5 in.; wing area—614 sq. in.; weight—4.25 to 5 lb.; recommended engines—.40 to .46 2-stroke or .56 to .65 4-stroke.

Sig Mfg. Co., 401-7 S. Front St., Montezuma, IA 50171; (800) 247-5008; (641) 623-5154.

GWS MICRO SPEED CONTROLS

GWS just released two new economically priced speed controls that are engineered specifically for the growing number of slow and park flyers. The GS100 5A speed control is exclusively for use with small slow flyers, such as the GWS Pico Stick. The GS400 15A speed control is primarily for use with park flyers, such as the SFM Soarstar, but it can also be used with slow flyers. Both speed controls are fully proportional and include an auto-shutoff that saves battery power for the receiver by shutting down the motor when battery power dips below a certain level. Both speed controls are priced right and available now.

Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511.



Dymond Micro RX D-50

Ever increasing its slow/park-flyer line, Dymond Modelsports now offers a micro receiver and a D-50 microservo. The receiver comes with either 4 or 7 channels, and both versions feature a detachable antenna segment for indoor close-range or outdoor long-range use. The D-50 microservo has 24 ounces of torque at 4.8 volts.

Dymond Modelsports, 683 N. Main St., Oshkosh, WI 54901; (920) 303-1100.

TnT

for the gear your model deserves

Landing gear of dubious quality supplied with kits and ARFs are nothing new. The movement toward larger and heavier models, however, has drawn increased attention to this problem. Some large kits and ARFs provide landing gear of poor quality or just not up to the task at hand. (Like the black one shown in the background). If you love everything about your model except its soft and poorly tempered gear, call the fixed-gear experts at TnT Landing Gear Products. They'll set you up with the best, like one of the aluminum ones shown in the foreground, and for reasonable price.

TnT Landing Gear Products, 10530 Airport Hwy., Swanton, OH 43558; (419) 868-5408.

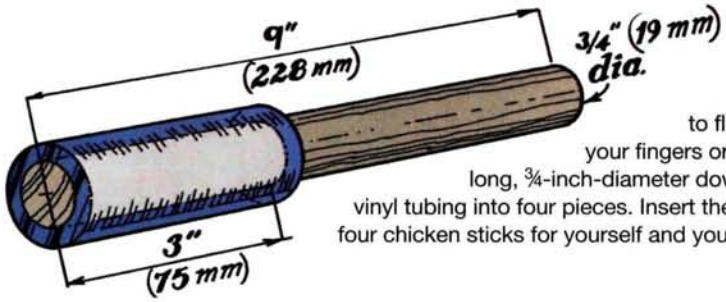
HINTS & KINKS

BY JIM NEWMAN

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or one-year renewal, if you already subscribe) for each idea used. Send a rough sketch to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.

For the past 26 years, "Hints and Kinks" has served as a forum in which readers help one another. Your practical advice, complemented by Jim Newman's technical artistry, has been the source of one of our most popular monthly columns. With this issue, Jim is retiring from *Model Airplane News*, and we wish him good health and good luck as he plots his new course.

This section of the magazine will continue under a new name with illustrations by David Baker.



"CHEEP" CHICKEN STICK

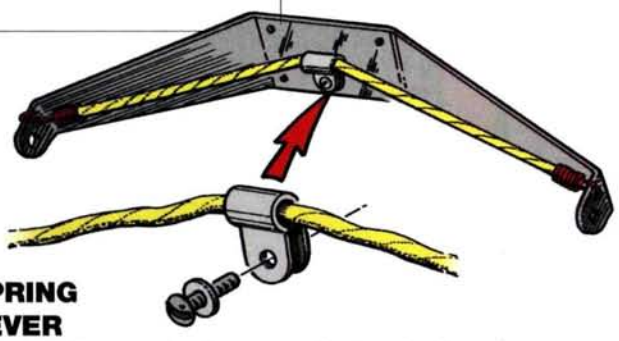
Use this homemade chicken stick to flip over your prop and avoid damaging your fingers or the prop's trailing edge. Cut a 3-foot long, ¾-inch-diameter dowel and one foot of 1x¾-inch-diameter vinyl tubing into four pieces. Insert the dowel into the tubing, and you have four chicken sticks for yourself and your friends at a nominal cost.

John Gustafson, Decatur, AL

HOOKED ON TRANSPORT

A simple way to secure your model to the carpeted floor of your vehicle is to strap lengths of hook-and-loop fastener over the model as shown. Just be sure the flight box is equally well secured, and you won't end up with a plastic bag of balsa splinters after some heavy braking!

Dawson Gillaspy, Long Neck, DE



SPRING FEVER

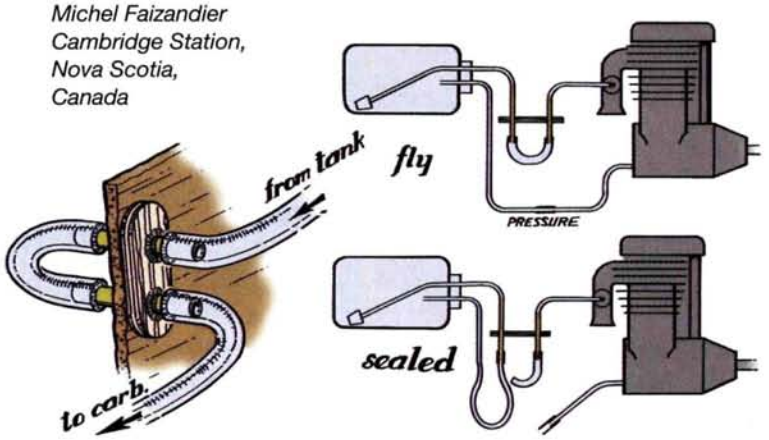
If your landing gear tends to spread out under those less-than-gentle landings, add a little more spring tension to the gear. Drill a couple of holes near the axle, hook a small bungee cord to it, then secure the middle of the cord to the center of the gear with a nylon clip or wire guide.

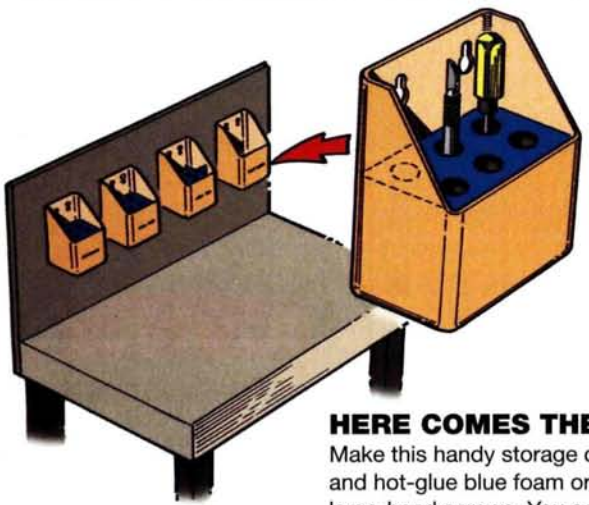
Randall Huston, Bolckow, MO

NON-SPILL TRAVEL

This simple external plumbing device allows the tank to be filled or the feed line to be broken with the pressure line plugged into the tank. Follow the circuit, and you can see that you will have made the system airtight, so the model can travel without spilling any of the leftover fuel in the tank. Don't forget to disconnect the pressure line when you fill the tank so that it can serve as an overflow vent.

Michel Faizandier
Cambridge Station,
Nova Scotia,
Canada





HERE COMES THE JUG

Make this handy storage container out of an empty, cutout juice or oil jug. Drill keyhole-shaped holes in the back, and hot-glue blue foam or Masonite dividers into it. The keyholes allow the jugs to be hung from a backboard on large-head screws. You can take them down if necessary.

Richard Ochmann, Lady Lake, FL

VINTAGE EYELETS

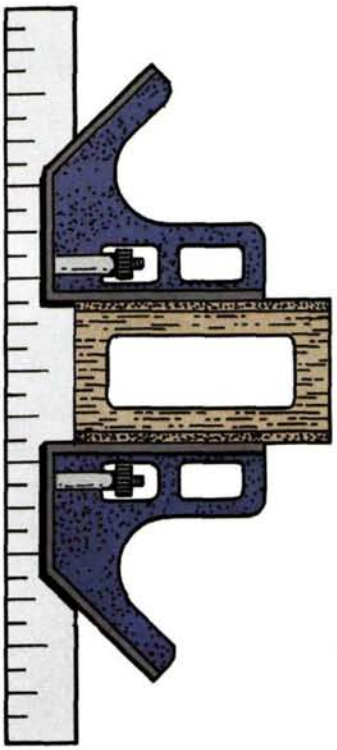
The rolled and padded leather coaming on old airplanes was laced into place through metal (usually brass) eyelets. Make mini eyelets by tightly winding soft brass wire around a suitable metal rod. Slip the coil off the rod and snip the individual coils from it. Slightly flatten each ring by tapping it with a hammer over an anvil, and then glue it over the pierced hole in the leather flange with a little CA. Hide the split in the ring under the leather lacing thong. The sketch shows the proper method of lacing the coaming through the turtle deck.

F.K. Spokes, New Milton, Hampshire, England

SQUARED AWAY

Slide two carpenter's squares onto one straightedge, then use them to assemble a true and square fuselage. After you've inserted the formers, snug the squares up against the two sides, then tighten the thumbnuts to clamp the sides into place until the glue has dried.

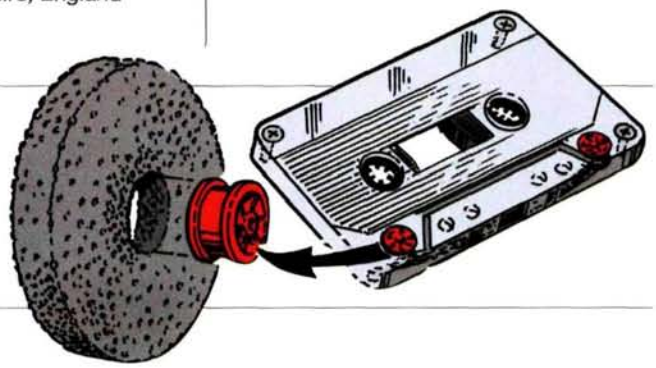
Ralph Erskine, Grand Junction, CO

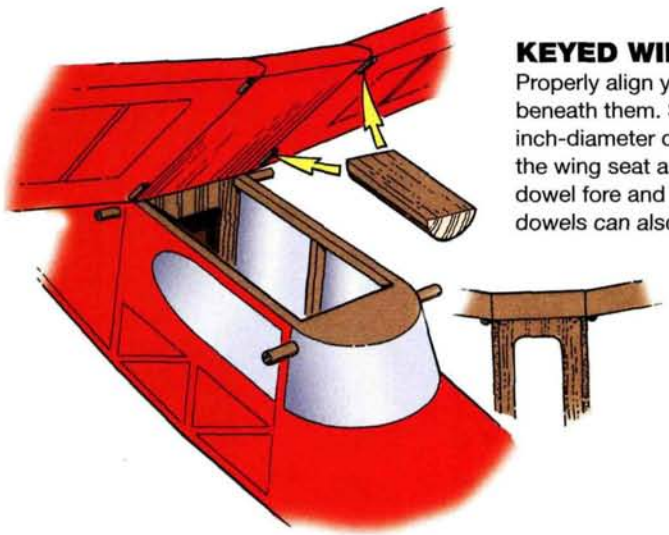


SLOW-FLIGHT BUSHINGS

Ultralight wheels for slow flyers are usually made out of dense foam, and a pair of free-running nylon hubs can be found inside an old audiotape cassette. Just press them into the center of the foam wheel and secure them with a smear of rubber cement or CA.

Merv Matthews, Palmerston North, New Zealand

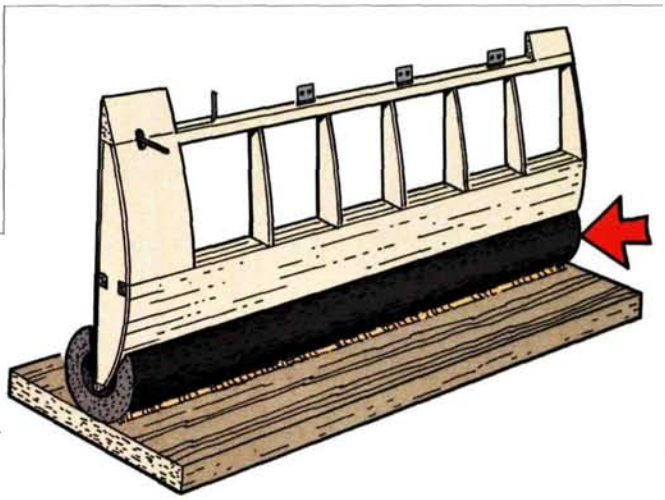




KEYED WINGS

Properly align your plane's rubber-banded wings before you glue split-dowel locating keys beneath them. Small models can use ⅛-inch-diameter dowels; large models can use ½-inch-diameter dowels. If a wingtip snags the ground, the half-round dowel will ride up over the wing seat and allow the wing to slew without damage. You can also use a single split dowel fore and aft on the centerline, each fitting into a little trough in the wing seat. The dowels can also be positioned on the inside of the wing saddle.

Raymond Sylvia, Somerset, MA



BALANCING ACT

Make this simple jig by hot-gluing a length of foam pipe insulation to a suitable heavy board, such as a piece of chipboard. Be sure the factory split is uppermost so that it will securely hold a wing without damaging it while you work on the hinges, etc.

Charles (Bud) Welch, Arkadelphia, AR ✈

PILOT PROJECTS

A look at what our readers are doing

SEND IN YOUR SNAPSHOTS. ***Model Airplane News*** **is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.**

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

ALMIGHTY AEROBAT

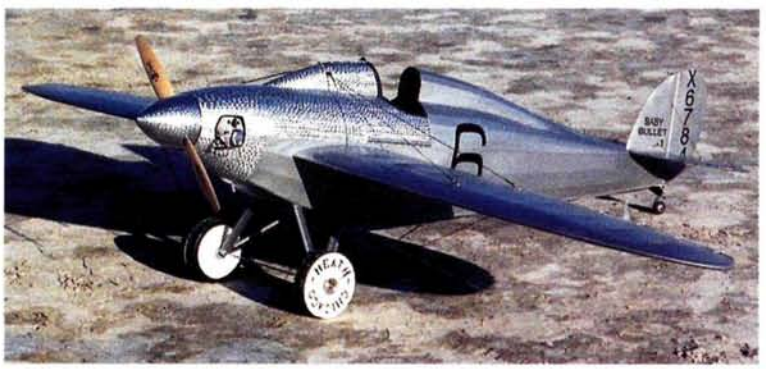
It is easy to see that Galloway, OH, resident Jeff Shapiro, who is dwarfed by the stature of his 40-percent Carden Aircraft CAP 232, does not take giant-scale modeling lightly. Powered by a 3W 150cc engine, this 116-inch-span machine rips through maneuvers. Jeff spent three months building the plane, outfitting it with nine servos and two receivers; he then finished it off with Ultracote and paint.

SUPER SE-5a

Robert Gillespie of Twin Falls, ID, put together this ¼-scale British Royal Air Force SE-5a biplane. Powered by a Saito 150 powerplant, it features functioning aileron, elevator and rudder controls in the cockpit, tempered-steel flying wires and a scale bomb that can be dropped by remote. Robert covered the model with Super Coverite fabric, and he topped it off with Super Coverite olive drab spray paint. The aircraft won Best WW I model at the last Quarter Scale Aircraft Association championship.

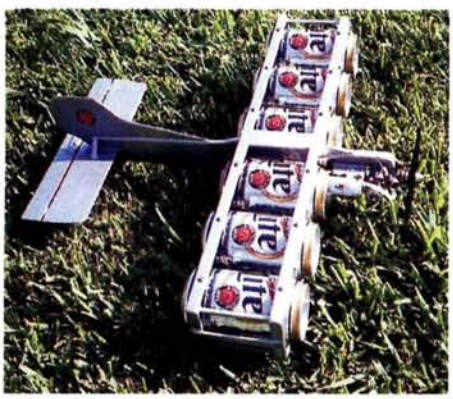
'LECTRIC BUCKER

Ellis Grumer of Phillipsburg, NJ, scratch-built this electric Bu-133 Bucker Jungmeister from the redrawn gas-model plan featured in the March 2000 *Model Airplane News*. With a wingspan of 58 inches, the 7-pound, 14-ounce model uses a geared Astro 040 on 21, 1700mAh cells to turn a 13x8 prop. It is a smooth and stable flyer, and Ellis is riveted by the plane's ability to perform impressive aerobatics with the best of them.



GO SPEED RACER

George Wardleigh of Ogden, UT, was inspired by the high-flying 1928 original flown by racer Ed Heath to design and build his 42-percent-scale Heath "Baby Bullet." The plane's O.S. 300FS twin engine and onboard glow driver deliver plenty of power to launch this sleek craft into aggressive aerial maneuvers.



CREATIVE HIGH LIFE

We don't know very much about this model, other than that we love the creativity behind its design. Rob Maghan of Mesquite, TX, nicknamed this aircraft "Six Pack" for obvious reasons. It is powered by a tiny Norvel ½A glow engine, and Rob assures us that it has excellent flight performance. A modeler for years, he prefers to fly designs of his own conception.

◄ HÓLA, SENIOR-ITA

Chuck Streebing, an electric model enthusiast from Spring Hill, FL, scratch-built this spunky little flyer following Sig plans. Chuck added ailerons and the flaps and increased the wingspan by 5 inches by adding extra ribs. With a 13x7 wooden prop, it uses 16, 1700mAh cells to power an Astro 25 and can fly up to 15 minutes on a single charge.

SHARP SABRE ►

Manuel "Manny" Abad of Long Island, NY, cradles his scale F-86 fighter, which Jack De Franza and the Meroke Radio Control Club built as a tribute to him.

Manny flew the full-size aircraft through 443 missions in the Korean War from 1952 to 1954. Powered by an O.S. .91 fan engine, from the tail numbers to the color scheme, the model is an exact replica of Manny's Air Force jet.

TOP DOG ▸

This impressive Top Flite P-47 is Northport, NY, resident Al Squillante's first attempt at a scale project. Powered by an O.S. .91 4-stroke, this model is outfitted with a dummy radial engine, a scale cockpit and pilot, a 4-blade static propeller and Century Jet pneumatic retracts. Al also added auxiliary gas tanks, including one beneath the center fuselage that drops by remote, and he finished the P-47 in 21st Century fabric.

◂ KELLYHAWK FLYER

Jim Snyder of Lake Havasu, AZ, marveled at the reputation of the Thorpe T-18 as one of the best homebuilt planes of all time, so he created the ⅓-scale model pictured here. It has an 85-inch wingspan and is powered by a Zenoah G-62. A true T-18 disciple, though, Jim also put together a ¼-scale replica powered by a 1.2 4-stroke engine, and he says that the smaller plane's stellar performance inspired him to build the larger model. ✈

12th Annual

SUPERMAN JE

by Rich Uravitch

Since I had missed the 1999 Superman Jet Rally, I was more than a little excited when the folks at *Model Airplane News* asked me to attend and cover the 2000 event in September. It gave me a chance to get back up to speed after a brief hiatus from jet activity. And let me tell you, a lot has happened, and quickly! Over the past 10 years, Superman has grown to overshadow almost every other RC jet modeling event. Along with that growth has come the perception that the latest jet products would be on hand, and this year's attendees weren't disappointed!

Sam Snyder and Tom Dodgon prepare Sam's simple sport jet. Nothing complicated here: no inlet, no ducting, no tailpipe. The turbine hangs out in the breeze; the model was frequently flown.

Lewis Patton flies his CAI F9F Panther. This big, scale jet is highly prefabricated and nearly all composite, and it flies great!

For those of you who were wondering, the event is named after the comic book superhero we've all come to know and love. He is revered around the town of Metropolis, IL, and it's clear that he will survive long after the current crop of animated cartoon wannabes slips into memory. Event director Jerry Caudle is also a fixed-base operator (FBO) of the Metro-

Even some of the fine ducted-fan airframes now house turbines. This BVM Bandit is typical of a great sport jet that is happy with either propulsion system. The "Aggressor" paint scheme works well on the model.

One of the CAI Raptors on takeoff, this sport jet looks very much like a scale model. Larger than average, it flew very smoothly.

Jack Diaz and Vern Montgomery probably have the most flight time on their BVM F-4s in the world. A bit of a nose-gear problem here didn't stop Jack from logging another flight, bringing him close to 300 sorties on this airframe!

E R M E T R O P O L I S

T RALLY

BVM's F-100 Super Sabre on the ramp at twilight. This is the latest from Bob Violett and will, no doubt, prove to be an extremely popular subject. Slats, flaps, speed brakes, externals: it has it all!

This is not an optical illusion or photographic compression! Shailesh Patel will campaign his big F-86 at Top Gun and Scale Masters. It weighs 50 pounds, has an 8-foot span and is nearly as long as it is wide, and it's AMT turbine-powered.

SUPERMAN JET RALLY AWARDS

Experimental Hour	Felipe Vidal	B-727
Best Sport Jet	Frank Pincheon	BVM Bandit
Best Scale Jet	Bob Violett	BVM F-100 Super Sabre
Craftsmanship	Sam Snyder	de Havilland Vampire
Best Multiperformance	Terry Nitsch	BVM Dassault Rafale
Pilots' Choice	Terry Nitsch	BVM Dassault Rafale

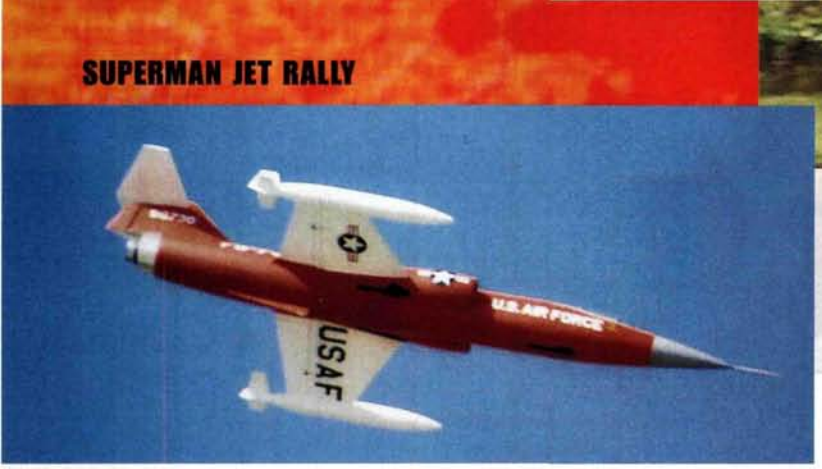
SPECIAL RECOGNITION AWARDS

Rob Lynch	BVM F-4 Phantom
Lewis Patton	CAI Raptor
Larry Kramer	BVM Bandit
Andreas Gietz	FiberClassics Eurofighter
Rei Gonzalez	RAM/BVM Bandit
Pat McCurry	Lockheed L-1011 Tri-Star
Scotty Balduc	CAI F9F Panther

polis Airport, so he made the facility available, as he has in the past, for this outstanding event. Wall-to-wall prepared surface provides all the space necessary for both the pit area and flying activities. Because Jerry believes that the participants should be able to manage themselves, only three flight officials were in charge of the activities. The result? One of the smoothest, most incident-free events I have ever witnessed. There were no frequency control problems, no arguments—just a lot of great jet modeling activity for participants and spectators. About the only thing that was *not* so accommodating was the weather! Thursday had nearly everyone comfortably attired in shorts and short-sleeve shirts; Friday through the event's conclusion on Saturday had us in jackets, gloves and ski hats! The dramatic change in conditions was appreciated only by the turbines; they just loved that cold, "fat" air!

Eddie Weeks taxies his big DC-10 out for another flight. The camera mounted forward of the vertical fin provided some great TV-monitor displays. The model is carved foam with a fiberglass covering.

PHOTOS BY RICH URAVITCH



Here's an unusual color scheme on one of the many F-86 Sabres on hand.

This is Bob Lundstrom's F-104 Starfighter in a high-vis drone scheme. The diminutive wing might make you believe it couldn't fly, but it did—and very well! It has a JetCat turbine and a Futaba radio; it's from the Philip Avonds kit distributed in the U.S. by Aeroloft Designs.

A DECADE OF PROGRESS

Ten years ago, the event focused on ducted-fan propulsion systems, and turbines were only discussed in a "wouldn't it be neat?" context. At the 2000 gathering, turbines clearly reigned supreme both in choice of power and sorties flown, as 141 of the 232 models present were turbine powered. In fact, the occasional ducted-fan model drew interest because of its sound! This form of aeromodeling has come a long way—evidenced by just how routine jet operation has become. Gone are the days when ducted-fan flying involved creating a propulsion package that integrated an amalgam of components designed for other applications. The newest generation of turbines simplifies propulsion even further. Now there are auto-start systems that monitor the turbine start-sequence and make sure you won't get into trouble; the auto-start will even shut the system down if the preprogrammed parameters are exceeded. With all of this automation, modelers can now concentrate on building and flying, and it is clear that jet modelers everywhere are taking advantage of the simplicity of operation offered by this form of jet propulsion.

FROM THE FACTORIES

Kit manufacturers were on hand to display and demonstrate the newest airframe offerings. No doubt about it: the airframers are keeping pace with the sophistication of the turbine suppliers. Most of the "kits" offered in the model jet world today are highly prefabricated, well-executed designs that usually incorporate a fair amount of composite structure. Typical of the breed were the Grumman F9F-3 Panther from CAI and its swept-wing successor, the F9F-6 Cougar offered by Century Jet Models. Equally impressive was the NA F-100 Super Sabre, the latest from the Bob Violett Models (BVM) stable. This high-tech fabrication is not reserved only for the scale models either; ducted-fan pioneer Tom Cook of Jet Model Products showed his new large Firebird, an all-composite model designed specifically for turbine operation. Along similar lines, CAI's new Predator, aka "Raptor on steroids," had a lot of folks stopping in the pit area. It's clear that the power for these large sport and scale models is readily available; designers and manufacturers are starting with clean sheets of paper (and larger drafting tables or CAD plotters!) and producing some really sophisticated and well-thought-out designs.

Another interesting diversion from the jet warbird scene, a Lockheed L-1011 Tri-Star finished in Delta markings. Scratch-built and flown by Pat McCurry, it was one of five civilian-scale transports on hand.

FROM THE FERTILE MINDS

The reliability and simplicity of turbine operation has also yielded some really creative results from scratch-builders and designers. Pat McCurry flew his new, single-turbine Lockheed L-1011, as well as a B-737 that he built for Felipe Vidal. Eddie Weeks had his camera-equipped DC-10 airborne all the time and downlinked to a display so you could see where the big bird was heading and what it was looking at. Those big-buck RPV and UAV guys down at Fort Huachuca don't have anything on Eddie! John Carlson, who can always be counted on to show up with something different, didn't disappoint: I spotted what appeared to be a Dassault FanFalcon under his tent. It seems as though many designers lean toward civilian subjects for jet airframes, evidenced by these models and the Vantage, beautifully done by Paul

If you attended the Weak Signals Toledo Show Expo, you've seen Jim Weigle's Concorde. If you weren't there, you missed something spectacular. It's in the final stages of flight prep, awaiting installation of its four turbines. The landing gear is a work of art, as are the nose cranking mechanics. The latest word was that Terry Nitsch will do the test hop.

The newest offering from FiberClassics is this Eurofighter flown by Andreas Gietz. Twin RAM 1000 turbines were used for power. Absolutely amazing slow-flight characteristics—it could almost hover!

One of many BVM Dassault Rafales flown at Superman. This one, by scale champ Terry Nitsch, took Best in Show honors. Not for the faint of heart or shallow of pocket, this incredible machine requires a pair of turbines.

Paul Appelbaum built this 94-inch-span Vantage from his own drawings. Formerly ducted-fan powered, the Vantage now is home to a turbine. It's nice to see a "bizjet" as a change of pace to the more prevalent warbirds.

A fair number of Kangaroo sport jets were on hand, including this camo version with "invasion" stripes. No visibility concerns here! In the background, Martin Lefebvre tends to some maintenance chores on his scratch-built Canadair Sabre.

Appelbaum. Paul's 94-inch-span, scale "bizjet" was formerly powered by a ducted fan and now uses a turbine to provide sparkling performance. Paul is one of the quiet, behind-the-scenes, talented guys who gets the job done without a lot of fanfare, and his latest model bears that out.

Somewhat less conventional, on the military side of the ledger was a pure delta-wing WW II German Horten model produced by Ivan Munninghoff. This unusual, turbine-powered model was produced primarily out of shaped foam and from Ivan's own drawings. After using a fair amount of runway on the takeoff roll, the Horten lost an argument with a runway light and was significantly damaged. I suspect Ivan has rebuilt it by now, and I look forward to hearing of its progress. Undaunted, and certainly not grounded, Ivan and his son Paul put on some impressive formation flying displays with their Top Gun Models F-15 Eagles. Those of you who have tried this type of flying know how difficult it can be; these guys did a great job!

Superman Jet Rally Sponsors
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JR Radios
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Paul McCaulley Ent.
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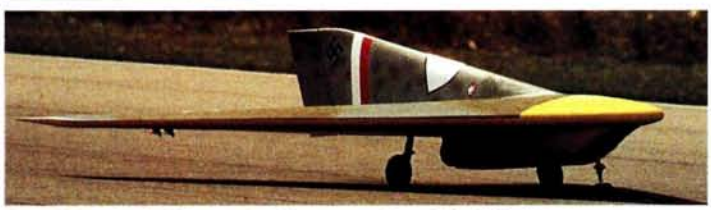
DOES THE MOMENT APPROACH?

Those of you awaiting the flight report on Jim Weigle's widely publicized Concorde may have to wait a bit longer unless news of its flight appears on the Internet. The huge model is indeed impressive and incorporates four AMT turbines as well as a nose-cranking feature that emulates the full-scale jet. The landing gear is a work of art, and the "model" needs only some final equipment installation and a sprinkling of holy water from the authorities to be flight-ready. Terry Nitsch, probably the best jet pilot around, has apparently been designated to do the test-hop chores, and a lot of us would sure like to see it happen. It is a spectacular model, an expensive undertaking and an incredible project that deserves to reach fruition.

No doubt about it: the Superman Jet Rally has become the preeminent event of its type in the country. If it's new, you'll see it here. If it's proven, you'll see a lot of it here. If it's on the horizon, you'll probably hear about it here. The nice part? No catalog sheets or advertising hype; you see it for yourself and can ask questions, and it doesn't get any more credible than that!

The event is scheduled around the same time every year; if your interest includes jets, this is a do-not-miss occurrence. You can contact Jerry Caudle at Pro-Mark for schedule dates for the 2001 edition. See you there!



Ivan Munninghoff brought this unusual model of the Horten WW II German experimental design.

SOURCE GUIDE

AEROLOFT DESIGNS
7919 E. Mawson Rd., Mesa, AZ 85207; (480) 380-4799; fax (480) 380-4843; www.aeroloft.com.

AMT
Rt. 2, Box 154A, Williamstown, WV 26187; (304) 375-3777; fax (304) 375-6362.

BOB VIOLETT MODELS (BVM)
170 State Rd. 419, Winter Springs, FL 32708; (407) 327-6333; fax (407) 327-5020; bvmjets.com.

CAI GAS TURBINE MODEL PRODUCTS
1284 Ashland Dr., Baton Rouge, LA 70806; (225) 925-9924; fax (225) 216-0214; razor@crowaviation.com; www.crowaviation.com.

CENTURY JET MODELS
11216 Bluegrass Pky., Louisville, KY 40299; (502) 266-9234; fax (502) 266-9244; www.centuryjet.com.

FIBERCLASSICS
distributed by Desert Aircraft, P.O. Box 18038, Tucson, AZ 85731; (520) 722-0607; fax (520) 722-0607.

FUTABA CORP. OF AMERICA
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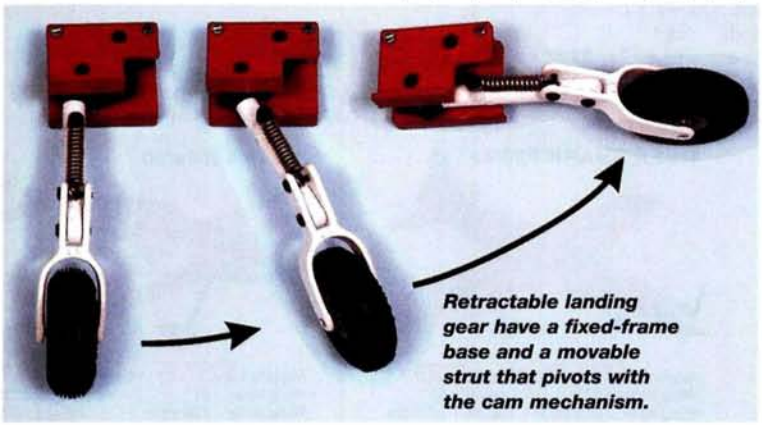
751 Airport Rd., Metropolis, IL 62960; (618) 524-2440; fax (618) 524-3617; www.pro-mark.com.

TOP GUN AIRCRAFT INC.
410 W. Jefferson St., Wing A, Ottawa, IL 61350; (815) 433-6132.

A user's guide for types, installation and operation

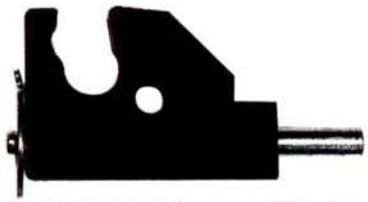
Retractable Landing Gear

by Joe Felice



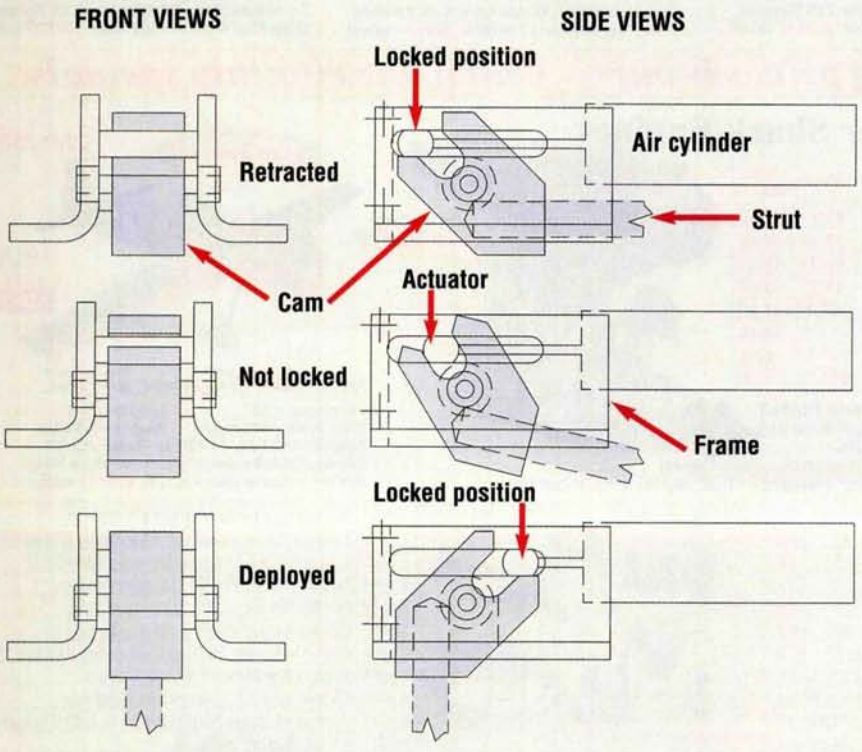
Retractable landing gear have a fixed-frame base and a movable strut that pivots with the cam mechanism.

I've been flying retract-equipped models since 1981, and I well remember my first one—a Jemco Focke-Wulf 190 D-9. Its mechanical retracts almost discouraged me from using retracts again. I really enjoy WW II fighter aircraft, however, so I stuck with it and learned to make reliable retractable landing gear by trial and error. I am very aware of the frustrations modelers feel when they first try to sort things out on their own. This guide should help you understand—and avoid—some of the many possible pitfalls, particularly those I experienced when I first tried to pull up my gear. Let's get started.



All standard retracts have one thing in common: the cam mechanism that transfers force to lift or deploy the gear. They may look different from gear to gear, but they all do the same thing.

FIGURE 1. CAM MECHANISM DETAIL



MECHANICAL, PNEUMATIC OR ELECTRICAL?

There are basically three types of retractable landing gear:

- mechanical;
- pneumatic—air driven;
- electrical.

There are many brands on the market, but they all have one thing in common: the cam mechanism that retracts the gear strut. The cam's layout and shape may vary for different gear, but its function and how the other parts relate to it are the same. See Figure 1: the cam mechanism is shown in three positions—up and locked—retracted (top); unlocked—transition (center); and down and locked—deployed (bottom). Notice the position of the cam and actuator in all three drawings. If the cam and actuator are not locked, the actuator is still within the active cam area, and the mechanism drive is forced to withstand all the flight and/or landing stresses.

A common reason why retracts fail to work properly is that the actuator doesn't travel the full distance between the two

stop positions. There are several probable causes: a tightly fitting frame member; incorrect cylinder throws; or debris lodged in the mechanism.

TYPES OF STRUT

When purchasing retracts, consider the strut configuration—and there are plenty to choose from. Shock-absorbing struts are very important and will "pay for themselves" on their first rough landing. They can be as simple as lengths of coiled music wire or more complicated, beautifully machined, aluminum-and-steel, spring-loaded telescoping units—"Oleo" struts.

For sport models and very small planes, wire struts are best because they cost little and are the lightest. For scale models, they can be dressed up with cosmetic covers, or you can add aftermarket struts such as Robart's Robo Struts. Other shock-absorbing struts have an offset-caster setup with an external spring and a pivot point.

Robart Mfg. has a wide selection of retracts from small ½A to giant scale. Here, mechanical and a pneumatic gear are shown.

The Oleo strut typically has a large coilspring enclosed in a hollow upper strut. The lower strut, which is also connected to the axle, slips into the upper strut and pushes against the spring. To prevent the lower strut from falling out of the upper strut and to prevent it from rotating, a drag-link scissors locks it into place while still allowing it to move up and down. Another way to lock the two gear struts together is with a slide bolt or a pin that travels in a slot cut in the side of the top strut (see Figure 2).

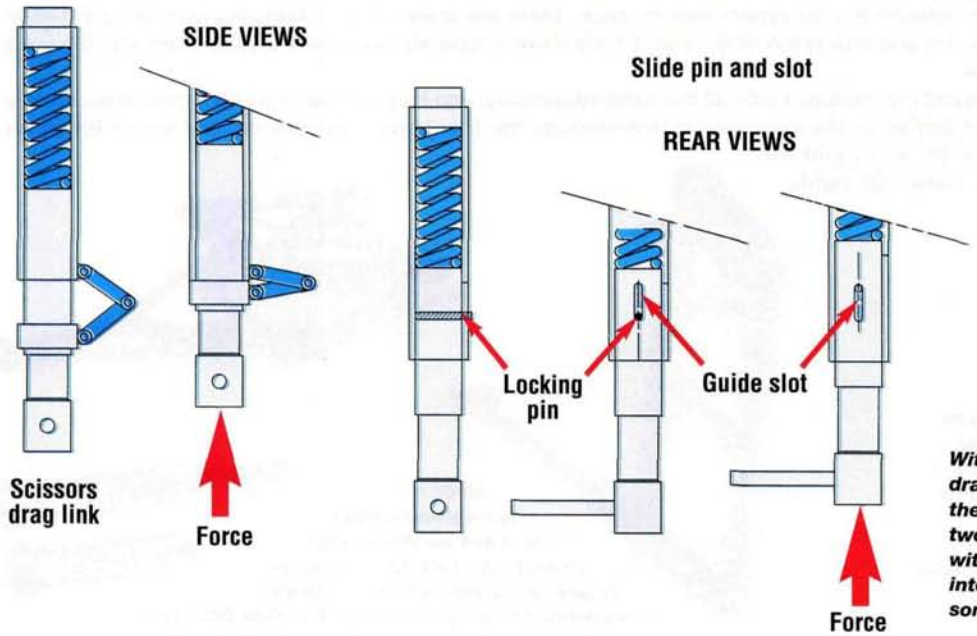
The strut's axle orientation will vary according to which design you want or need. The simplest is a straight offset axle that is supported directly by the strut. Offset axles can have a single or a dual setup for one or two wheels. Dual wheels are typically used with the nose gear on jets.

These EuroKit units are good examples of offset caster gear. The spring absorbs landing shock as the lower end pivots backward.

Also, the axle can be supported by a cast or bent steel fork. You'll find an offset fork on the main gear of most WW II fighters. The two-fork design—or "stirrup" setup—is also popular and is very strong and rigid.

Check the manufacturers listed in the "Source Guide" for all the other goodies you may want for your retract-equipped model. Once you understand how retractable landing gear work and how to properly install and care for them, they will always be an attractive option for your models. Being able to pull up the gear to enhance scale appearance, reduce drag, or just for the fun of it is a real blast. A common problem with retract-equipped airplanes is that they often have weak internal attachment points for the retract units. The stronger your mounting system is, the more effectively it distributes the landing force. In a normal landing configuration, tensile loading tugs the front rails and may pull them out of the model, while compression loading pushes the back rails into the wing. Tying the two ribs on either side of the gear to the front landing-gear-mount rail will greatly increase the front rail's strength.

FIGURE 2. DRAG LINKS AND STOPS



With 2-piece shock-absorbing landing gear, a drag link of some kind must be used to prevent the lower strut from rotating and to prevent the two struts from coming apart. This is done either with a simple alignment pin and a guide slot cut into the upper strut or with an articulating scissors drag-link arrangement.

MECHANICAL GEAR

Pattern airplanes use mechanical retracts almost exclusively, and most ARF manufacturers recommend them. They use one special 180-degree-travel retract servo to drive all of the retract units.

It takes some time to correctly set the linkages for the servo and pushrods that lead to the gear; once installed, however, they require relatively little maintenance. Mechanical retracts can lift only a limited strut and wheel weight, but they are usually required to lift only lightweight wheels and simple, music-wire gear struts.

The big advantage of this type of gear is that it's the lightest available, mainly because the setup for all the gear shares a common drive servo.

Check that the pushrods aren't bowed, and if one (or more) is, replace it. Always lift the model off the ground (or invert it) when turning the radio on and off. This will prevent pushrods from being bent and possibly stripping the retract servo gears.

These affordable, sport-style mechanical gear from Great Planes are ideal for pattern and sport-scale models.

These P-51 Mustang-style Century Jet Models mechanical gear also feature Oleo-style struts and a cast-steel offset-fork design.

PNEUMATIC GEAR

Giant-scale retracts have to take a lot of wear and tear. These custom-made, heavy-duty P-47-style gear built by Sierra Precision have an attached scale "shrink bar" that shortens the strut when it is in the retracted position.

The most popular retract units—and my favorites—are pneumatic (air-driven) gear, which are available in sizes for .25 models up to very large giant scale. Though heavier than mechanical gear, they have more lifting power than any other type, so they're perfect for scale models. You can include Oleo struts, scale wheels and even functional brakes on pneumatic gear.

Stock units with wire gear will snap up and down vigorously. The retraction and deployment speed of pneumatic retracts can be slowed by slipping a wheel collar over an air line to pinch off the air; simply tighten the setscrew to close off the flow. You must file the end of the setscrew smooth, however, or it might damage the air line.

Pneumatic retracts require proper maintenance. There are at least two O-rings in each cylinder: two in the control valve and one in the filler valve. Check them frequently because if they're worn, you'll have a pressure leak.

Before I install my retracts, I lube all the parts individually, and I repeat this every 50 flights or so. I add a few drops of fine oil to the air-reservoir tank through the filler valve. I bought my first set of Rhom-Air retracts in 1981 and I still use them today, some 700 flights later.

Made of formed and welded steel and air-driven with Robart cylinders, these specialty gear are made by Robart and distributed by Great Planes for the Top Flite DC-3 kit.

Left: these mechanical EuroKit retracts have standard, bent-music-wire struts. The coil absorbs landing forces.

Mechanical retracts are driven by special 180-degree-travel retract servos such as these from Futaba and JR. Both types are also "low profile" and fit easily into thin wings.

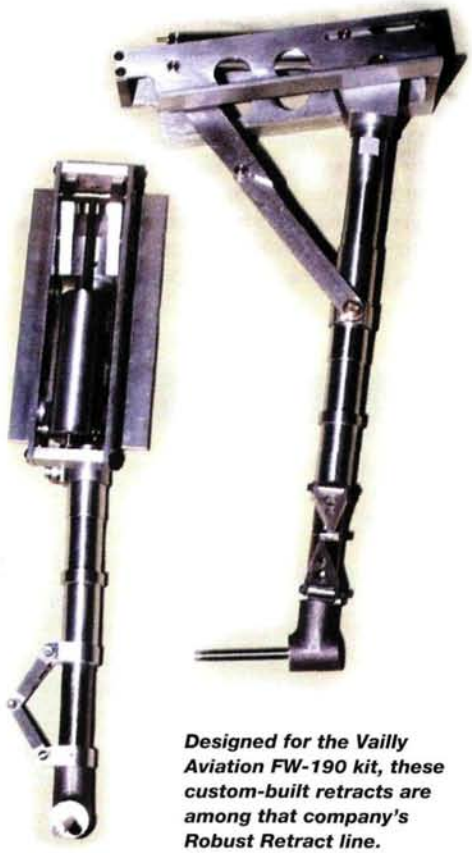
A budget-priced set of mechanical main-gear sport retracts costs about $19.95 and will usually be a very good value. These mechanical retracts don't have precision stops, i.e., when deployed or retracted, they might move quite a lot even when locked into position. This movement does not hurt anything, but it may cause the entire model to wobble while taxiing.

Many ARFs come with mechanical retracts or are ready for them; flying an ARF that comes equipped with retracts is a great way to gain experience with them while avoiding the effort of installing them.

ELECTRICAL GEAR

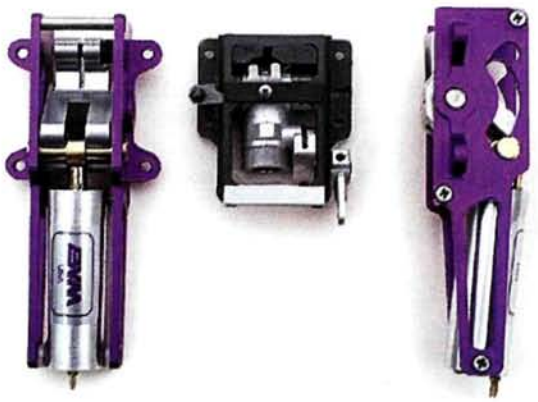
An electrical retract is simply a mechanical unit that has a retract servo, or motor, in it. Other units have an electrically driven jackscrew that actuates the strut. Electric retracts work well for scale models of all sizes that require large struts and heavier scale wheels. The extra lifting power of an electric unit does, however, bring with it extra weight, both in the gear itself and in the extra battery pack that's required to power it. It does offer the great advantage that those cantankerous linkages and pushrods are replaced by easy-to-manage wire leads. Likes Line offers an extensive selection of electric retracts that are very popular with giant-scale modelers.

Likes Line electrically driven retracts are available in several sizes and styles, are popular for giant scale and provide a neat, linkage-free installation.



Designed for the Vailly Aviation FW-190 kit, these custom-built retracts are among that company's Robust Retract line.

B&D Enterprises makes these popular, rugged, air-driven gear in several sizes and of molded and machined nylon/plastic.



These beautifully finished BVM retracts are for the BVM Balsa Bandit kit. The mains are pneumatic, and the nose-gear unit is mechanically driven. Note the up- and down-lock slots in the side of the main gear frame.

TROUBLESHOOTING PNEUMATIC RETRACTS

Pneumatic retracts occasionally leak because of wear, a worn air line, vibration, or loose fittings.

Here's how to troubleshoot a leaky system and quickly solve the problem. I keep a small hobby knife, surgical clamps (hemostats), an air pump (with a pressure gauge) and a piece of brass tube (with the ends deburred) in my flight box just for this.

STEP 1. Once I suspect a leak, I pump the gear up to full pressure and watch the pressure valve. I then retract the gear, pump the system back up to full pressure and watch for pressure loss.

B&D also makes a complete line of valve fittings and connectors for its gear. The valve is also made of plastic and works extremely well.

- If pressure is lost when the gear is retracted but not when it's deployed, the leak is in the retract lines; go to Step 3.
- If pressure is lost when the gear is deployed but not when it's retracted, the leak is in the deploy line; go to Step 3.
- If pressure is lost when the gear is deployed and retracted, the leak is between the filler valve and the control-valve lines; go to Step 2.

STEP 2. With this type of leak, the problem is often caused by a dry or poorly fitted filler valve; the other possibility—although it's remote—is a faulty control valve. Fill the system to full pressure again, remove the filler from the filler valve and leave it for at least five minutes.

- If no pressure is lost, the problem is in the filler-valve connection, so you'll have to replace it.
- If still losing pressure, then fill the system again and put water in the filler-valve opening.
- If you find bubbles, drain out the water, add oil and retest. If, after you added oil, bubbles still appear, replace the filler valve. If there aren't any bubbles, repeat the test for both sides of the control valve. If the control valve or the filler valve don't show bubbles, replace all of the air lines that lead from the control valve to the filler valve.
- If the system still leaks, the problem is the tank. Replace it. At this point, there shouldn't be any pressure loss from the system, or the problem should have been located.

Proper maintenance is very important for pneumatic retract systems. These air lines, the fittings and pressure gauge are from Robart Mfg.

STEP 3. This step is for pressure leaks in the lines that run from the control valve to the cylinders. At this point, we have narrowed the cause of the leak down to the retract or deploy lines. Cut the suspect line close to the control valve, leaving enough hose to allow you to attach the pump directly to it. Pressurize each side of the tubing cut—one side at a time—looking for pressure loss. Replace the tubing on the side with the pressure loss.

Air tanks are part of a pneumatic gear system. They come with small fittings over which the air lines are slipped. They are available in several sizes.

Use the brass tube to join the old air line to the new one so that you'll be able to pull it through the model. The thin hobby knife and hemostats are used to remove the old lines from the nipple fittings on the cylinders. I am always very careful here because a scratch in the nipple will cause another leak that I won't be able to repair at the field. Cut partway through the tubing, then use the hemostats to remove it; if you can't get the tubing off, it's easy to make another cut on the other side of the tubing. In some retracts, the nipple is held in only by a press fit, and pulling too hard on the tubing may remove it from the cylinder. Don't use force.

RETRACT SOURCE GUIDE

B&D Enterprises
Rte. 81, Box 7, Ballard, WV 24918;
(304) 753-4636.
Low-profile design; mechanical and pneumatic units; steerable nosewheel with either firewall or belly mounting bracket; complete systems with air tank, fittings and air lines available.
Individual units—$27.99; pair—$49.95; set—$89.95.

Bob Violett Models (BVM)
170 State Rd. 419,
Winter Springs, FL 32708;
(407) 327-6333; fax (407) 327-5020;
www.bvmjets.com.
Pneumatic and mechanical units with wire or aluminum shock-absorbing struts; frames made of machined aluminum or molded carbon fiber; units available for all BVM jet kits; complete installation systems, including air valves, fittings and air tanks.
Individual units— $80 to $300; set— $140 to $1,200.

Barton Machining
377 Bruce Rd., Lake Ozark,
MO 65049;
(573) 964-6718;
www.genebarton.com.
Custom-machined, pneumatic aluminum gear with shock-absorbing Oleo-style struts for giant-scale and racing aircraft; several axle configurations, air tanks, gauges and installation accessories available.
Custom gear— $250 to $650.

Century Jet Models
11216 Bluegrass Pky., Louisville, KY 40299; (502) 266-9234; fax (502) 266-9244; www.centuryjet.com.
Many pneumatic all-metal gear sets; extruded T-6 aluminum body and shock-absorbing struts; several sizes, including giant scale; reversible retract direction available; investment-cast stainless-steel cam; struts available with offset P-51-style yoke; dual- yoke fork and straight hubs available; functional Oleo struts; brass bushings; stainless-steel drag links. Custom struts and complete system hardware available.
Set—$195 to $1,200 (includes air system).

Dave Brown Products
4560 Layhigh Rd., Hamilton, OH 45013; (513) 738-1576; www.dbproducts.com.
Southern-Pro mechanical retractable systems can be used in planes weighing up to 10 pounds; precision built and designed to withstand the vibration of high-powered competition airplanes; units feature positive down- and positive up-locks; all moving parts are supported by nylon bearings for low friction and easy, one-servo operation; every "wear point" is hard-anodized for durability; single nose gear, main-gear (pair) and complete tricycle-gear sets available.
Nose strut—$32.95; tri-gear—$85.95.

Dave Platt Models
1306 Havre St. NW, Palm Bay, FL 32907-8061; (321) 724-2144.
Contest-proven pneumatic gear made of machined aluminum; come with functional aluminum Oleo struts; available with 90- or 110-degree up angle and other retraction angles to suit various scale aircraft; has positive up- and down-locks.
Single unit—$125; standard main set (pair)—$299; tri-set—$450.

EuroKit North America
Montreal, Quebec, Canada; (514) 363-4546; fax (514) 363-5363; www.eurokitplane.com.
Pneumatic and mechanical gear with fixed wire strut. Units made of duralumin (hard aluminum), with nylon/steel mechanism and a return spring to ease the servo load; also units made of molded nylon and with shock-absorbing articulated struts; several styles, complete system packages.
Mechanical unit—$25 to $80; air-driven unit—$74 to $226.

Sierra precision
11941 Abbey Rd., North Royalton, OH 44133; (800) 927-4530; fax (440) 230-2318; www.SierraPrecision.com; darrellcnc@aol.com.
CAD-designed and CNC-manufactured giant-scale retracts; field tested by demanding modelers; systems made of aircraft aluminum, stainless steel, brass, bronze, or 4130 tubular steel—no plastic parts; ultra-rugged for giant-size warbirds; feature scale-diameter spring-loaded Oleo struts; standard systems include mechanical cam up- and down-locks; large-diameter pneumatic actuating cylinders for very positive operation; available with 75-, 80-, 85-, 90-, 100- and 110-degree retract-angle travel; rotating main gear also available for P-40, Skyraider, Corsair, etc.
Individual unit w/o strut—$250; pair—$350 to $450; set—$550.

Hobbico
Great Planes Model Distributors Co.
P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.
Low-profile mechanical units for sport models available in three sizes; mounting flanges on the nylon-reinforced composite housing conform to wing shape; 88-degree deployment angle; all units except .10 size include adjustable axles.
Set—$21.99 to $34.99.

Jet Model Products
211 N. Mullen Rd., Belton, MO 64012; (816) 331-0356; fax (816) 331-3930.
Pneumatic Mk-10, Mk-20 and Mk-30 sets with four-way valve; mechanical down-lock and up-lock positions held with air pressure; model weight range: Mk-10—10 to 17 pounds; Mk-20—17 to 30 pounds; Mk-30—over 30 pounds; suitable for all JMP kits and other jet models.
Set—$365 (Mk-10); $1,100 (Mk-20); $1,300 (Mk-30).

Likes Line
1601 Airport Dr., Mechanicsburg, PA 17055; (717) 732-0636; www.aero-sport.com/likesline
Electrical jackscrew-operated gear provide standard and rotating strut movement; available for .90 to 1.20, 1/5-, 1/4-, and 1/3-scale aircraft; come with struts, battery pack, charger and switch harness; adjustable retract speed and angle; Struts are scale-looking spring Oleo and cut to length for your requirements.
Set—$399 to $535.

Robart Mfg. Inc.
P.O. Box 1247, St. Charles, IL 60174; (630) 584-7616; fax (630) 584-3712; www.robart.com.
From 1/2A .15 to .40, .45 to .61 mechanical units to giant-scale pneumatic sets; wire and steel-tube Oleo shock-absorbing struts, including rotating—P-40 style— offset and tailwheel units. Also several custom sets for popular kits. Giant gear have welded-steel-tube construction with steel axles; offset, straight and stirrup axle styles.
Strut—from $29.95; sets—up to $595.

Spring-Air Products
P.O. Box 37-3218, Satellite Beach, FL 32937; (407) 728-9002; fax (407) 728-2881; www.retracts.com; spgair@earthlink.net.
All-metal pneumatic gear in sizes small enough for .25 to .40 and 1/4-scale aircraft; strong, one-piece 6061 T6 aluminum frame with positive locking slot with mechanical up-lock and down-lock positions; air-powered with Spring Air's fail-safe spring return; three types available—90-, 85- and 74-degree strut-retract angles.
3-gear set—$150 (small); $175 (medium); $270 (large).

UEI (Usher Enterprises)
Model Division, Usher Tool
9810 NW Gordon Rd., Cornelius, OR 97113; (503) 647-2851; fax (503) 647-7520; www.acsip.com/~dgu.
Pneumatic, machined-aluminum gear with wire or aluminum shock-absorbing struts; positive up- and down-lock; main gear and steerable nose gear with single- or dual-wheel axle style.
Single unit—$40 to $75.

Vailly Aviation
18 Oakdale Ave., Farmingville, NY 11738-2828; (631) 732 4715; vaillyav@optonline.net.
Robust Retracts—a complete pneumatic line to fit all Vailly Aviation models and other giant-scale designs; built for serious warbird enthusiasts; highly reliable; made of 6061 T6 and 7075 T6 aluminum; all include shock-absorbing struts; many high-stress areas made of stainless steel; all have 1/4-inch-diameter steel axles; available for Typhoon, Tempest, Sea Fury, FW-190, and P-47; tailwheel unit available.
Main-gear set—$450 to $800; tail units: $85 to $200.

Yellow Aircraft
203 Mass. Ave., Lexington, MA 02420; (781) 674-9898; fax (781) 674-2288; www.yellowaircraft.com.
Extensive line of scale pneumatic retracts for all Yellow Aircraft kits; high-quality aluminum and steel with shock-absorbing Oleo struts; for both jet and prop-driven kits; air cylinders, valves and setup hardware available.
Nose gear—$65; main gear—$185; complete set—$810. +

MODEL AIRPLANE NEWS
PRODUCT
REVIEW

A cutting-edge RC flight simulator

MACHINEWORKS NORTHWEST

Cockpit Master

by Gerry Yarrish

One of the great RC accessories that has evolved from the continuing development of personal computers and microprocessors is the flight simulator; specifically, simulators (sims) that are controlled by plugging in a dummy radio box or your own personal transmitter with an interface cord. It is now a commonplace experience to enter a virtual flying field and experience any number of computer-generated model airplanes. From simple trainers that are all but impossible to crash to giant-scale fighters and bombers, high-performance aerobats and helicopters, practically everything that you can fly in the real world is now available in a virtual reality (VR) version.

One of the newest RC flight sims to enter the market is the MachineWorks *Cockpit Master* distributed by Multiplex USA. This powerful program comes with many delightful features. It has more than 20 model files to choose from and 12 runways/flying fields to "fly" at. The photo-realistic graphics are

Continued on page 50

The VR Squadron

The simulator comes with a huge selection of airplane choices, and it's very easy to select the one you want to fly. Click the "Airplane" button, and you are shown the selection window. All the model names appear on the left, and a large, animated picture appears in the upper right-hand corner. The comment box contains a written description of the model and, in many cases, a URL website address (www.) is also shown for that specific model. The aircraft types

you can fly include glow and electric power, glider/sailplane, slope soaring, multi-engine, racer, indoor and park-flyer models. Each has its own default configuration, but you can click "Change Aircraft Settings" to adjust the model's attributes to suit your flying style (see onscreen features sidebar.) You can change the airfoil, the model's weight, its CG location, wing area, span, engine and prop size, engine HP, minimum and maximum rpm limits and fuel capacity

(in seconds), to name only a few. In the Advanced settings menu, you can make really detailed changes; the selection of parameters would make Andy Lennon proud! You can enter data for horizontal- and vertical-tail surface areas; elevator, aileron and rudder surface areas; wing angle, dihedral and position; fuselage drag; pitch inertia as well as lift and drag coefficients, and you can choose either metric or imperial units of measure.

SPECIFICATIONS

Product: MachineWorks Northwest *Cockpit Master*

Type: RC flight simulator

Distributed by: Multiplex USA

Minimum system requirements: Windows 95 or 98; Pentium 300MHz processor (400MHz for multiplayer), 3D graphics card; 50 MB available hard-drive space; 32 MB RAM (64 MB for multiplayer); 2X CD-ROM drive; Super VGA monitor; 28K modem and Internet access for multiplayer.

Prices: $99 (simulator, interface cord and adapters); $199 (package: simulator, interface and Multiplex Picoline MPX transmitter)

Features: the program includes 23 models of various types, from scale planes to racers and gliders, plus 40 more downloadable from the Web for free; 12 runways with all types of terrain; nine training and game scenarios, including takeoff and landing, deadstick, crosswind and dogfight; wind and daylight settings; dozens of aircraft parameter adjustments for gas, electric and gliders; transmitter-interface cord links to virtually any transmitter; multiplayer mode supports up to six players.

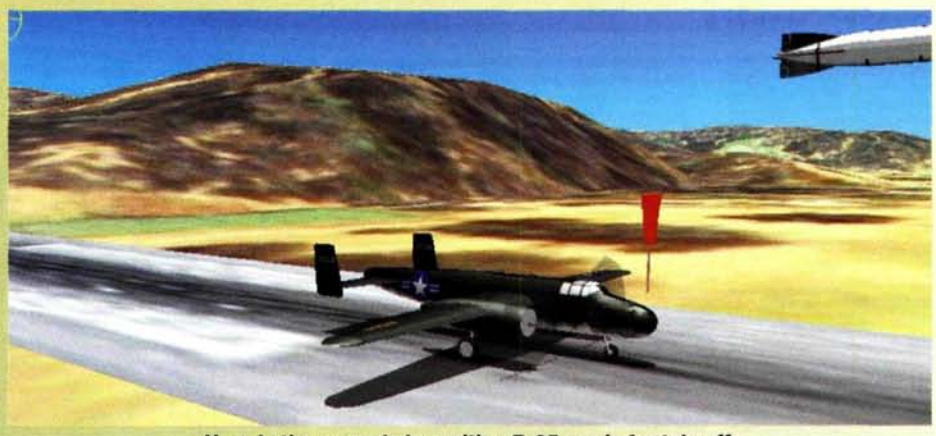
Hits

- Excellent variety of planes and flying environments for beginners and advanced pilots.
- A constantly expanding library of models to download makes *Cockpit Master* a real value.
- Excellent graphics and solid program physics.

Misses

- Default rudder control and response settings not as realistic as other controls' (but are adjustable).

With the Miscellaneous button, other adjustments can be made to the simulator, such as turning smoke trails on or off; detecting ground crashes (with flames); detecting stalls and spins; zooming automatically and selecting the simulator's operation speed in percent.



Here is the normal view with a B-25 ready for takeoff.

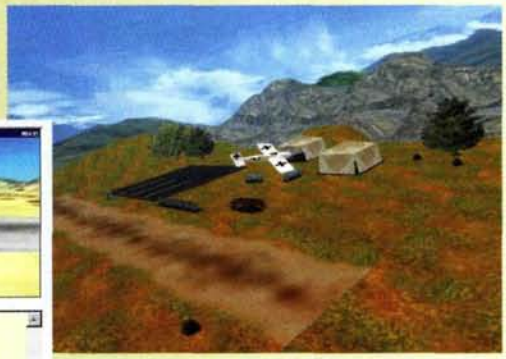
Active Runway

Before you fly your model, you have to select the flying field and activities you want to experience. Again, there are several options. I flew most of my VR sorties at the "RC Club field," which has a few houses and trees, a paved runway and—of all things—a huge dirigible floating in the air some distance from the runway. Yes, you can crash into it; if you are skilled enough, you can even land on top of it as if it were an aircraft carrier. Other flying-field scenarios include simple and difficult balloon-busting missions, deadstick practice, crosswind (on takeoff and landing), simple and difficult dogfights and several others. You can select from many locations, too, from flat, grassy flying fields to cliffs and hills for slope soaring and even an ocean beach.

The B-25's "in cockpit view" is more like the upper gun turret view but it is still a fun window to fly in.

The "chase plane" mode gives an air-to-air view. Note the big airship in the distance.

You can also select the viewpoints for each flight. By pressing the F1, F2, or F3 keys, you can switch around among the Tower (normal ground-level) viewpoint, the cockpit view, or the chase-plane viewpoint. Each is fun, and you can switch from one to the other while on the fly. Another very nice feature is the F10 key; it allows you to adjust model settings without having to end the flight session, which is normally executed by pressing the Escape key.



Above: here is another flying field setup with a Fokker Eindecker seen in the chase-plane mode. Left: the flying-field-selection screen shows a small thumbnail view of the available flying locations.

These two screens show multiplayer scenes, both in the air and in the hangar.

very good, and the level of detail is above average. As well as having an ever expanding library of model aircraft to choose from, *Cockpit Master* is capable of being used as an Internet-connected multiplayer flight sim for use with other VR pilots using the same program. This feature works well with the dogfight scenario. Other cool features include close-up zoom views and being able to turn smoke trails on and off and fly from vastly different locations. *Cockpit Master* also has a movie recorder feature so you can view your flight again. Here's what I found when "flying" the sim.

SETTING UP THE PROGRAM

The program is supplied on a CD-ROM and is self-installing with an installation wizard. The program places itself in the C drive "Programs" folder, but it does not automatically create a shortcut icon for your desktop. I installed *Cockpit Master* on a Dell Inspiron 7500 laptop computer and had no difficulty running the program with several of my JR transmitters, including the JR XF631 and the 8103. The program comes with a parallel-port cable that you connect to your transmitter through its trainer or direct servo-control (DSC) jack. You should connect the cable to the computer and radio before you power up the PC. Some adapter cables for other radio brands are also included.

Several small electric flyers are included with the program. Others, such as this Northeast Sailplane Elipstick, may be downloaded free from the* Cockpit Master *website, www.cockpitmaster.com.

THE PAYOFF!

So why would you trade your balsa-and-plywood model for a moving 2D icon on the computer screen? Well, you aren't really trading them; you're supplementing your real-time flying experience with the accurate sensory feedback supplied by the computer-generated simulation of flight. This way, you can practice advanced maneuvers and train newcomers without any risk to an expensive model. Basically, the flight sim trains your eyes and hands to work together so the

Virtual Model List

Something that sets this flight sim apart from others is the huge selection of models that is included. Besides offering generic VR models, *Cockpit Master* also offers accurate simulations of real-life kits, ARFs and other RC model airplanes on the market today. The list includes:

KIT AIRPLANES

Ace Hobby Distributors
Simple 400 (Speed 400 sport plane)

Airborne Models
71-inch Piper Cub (trainer)
Dago Red P-51 Mustang
Tai-ji (.40-powered pattern ship)

Airwise
Rebel (.60-powered pattern ship)

Balsa USA
Fokker Eindecker (giant-scale)

Clancy Aviation
Lazy Bee (fun-fly)

Horizon Hobby Distributors
Soarstar (foamy trainer)
PicoStick (mini park flyer)

Innovative Model Aviation
C-130 (4-engine electric)
Horton Flying wing (scale twin electric pusher)

Multiplex
Twinstar (twin electric)
PicoJet (electric combat delta wing)
PicoCub (electric park flyer)

Sig Mfg.
LT 40 (glow trainer)

Thunder Tiger
TigerStick (sport fun-fly)

Todd Long Models
Tiny (micro aerobat)

Trick RC
Zagi (electric flying wing)

GENERIC AIRCRAFT

B-25 (twin glow-powered)

Grobe (80-inch glider)

SunRa (slope racer)

DH-88 Comet (twin engine racer)

Do 335

■ Several more airplane files can be downloaded from the *Cockpit Master* website, www.cockpitmaster.com. They are:

Bugatti Racer (slope-sail and gas versions)

X-Ray, Hotliner, B2

Twinjet MPX (two versions of a twin Speed 400 jet)

Zagi (six new versions with various color schemes for multiplayer combat)

■ These are some of the planes currently in development that will be available on the website by the time this issue is printed:

Miss America Mustang (.60-size)
P-38 (.90-size giant scale)

3 Seabees
Wright Flyer and Blériot

Airworld
Super Constellation (4-engine airliner)

Braun Modelltechnik
Mouse (indoor flyer)

Electric Jets
A-10

Herr Engineering
Aquastar, Mustang, Starlite

Lanier
Stinger 120/60

Sig Mfg.
Four Star 40, LT-25

As you can see here, the surface detail on the VR models is quite good. Markings and even panel lines make the models look very realistic.

This close-up view shows the Do 335 coming in with smoke trailing.

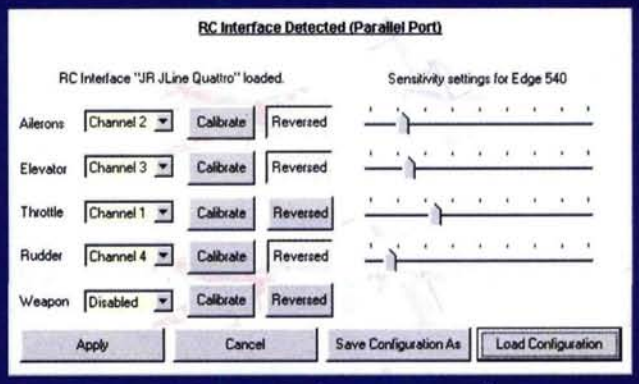
required tasks of controlling (and possibly saving) a model become automatic and second nature. When you go to a real flying field, the virtual experience pays off when the student needs less "think time" to fly maneuvers he has already practiced at home. With *Cockpit Master*'s multiplayer function, the program also becomes a very impressive "in-the-cockpit" flight sim where you can match skills against another pilot (or target), if you get what I mean!

RC flight sims are a valuable teaching and learning aid with the very real added benefit of just being a whole lot of fun. Overall, *Cockpit Master* is a very flexible and pleasing flight simulator to use. You can structure any of the models to exactly the parameters you want and then fly the model to see what various setting changes do to its performance. It can also be used by RC clubs to introduce non-modelers to our hobby in a safe, fun and realistic way, and it can be a valuable PR tool for clubs to use at mall or trade shows. If you want to experience the VR world of RC flight, *Cockpit Master* is a very good place to start.

***MachineWorks Northwest LLC**, distributed by **Multiplex USA**, 560 Library St., San Fernando, CA 91340; (818) 838-6467; fax (818) 785-3946; www.multiplexrc.com; www.cockpitmaster.com.*

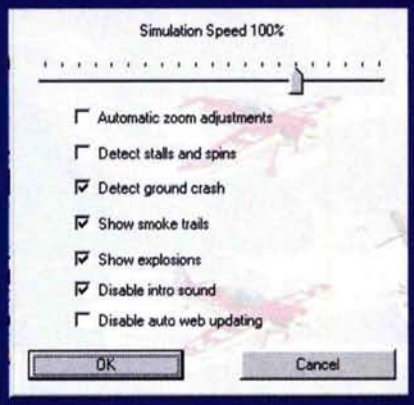
Onscreen Features

The program opens to the welcome (title) page, and it is here that you can enter the different sections of the program. You can select and set up the model you want to fly, (see "The VR Squadron" sidebar), and you can choose the location of the flying field. When you run the program the first time, a Help menu is available to answer your questions.

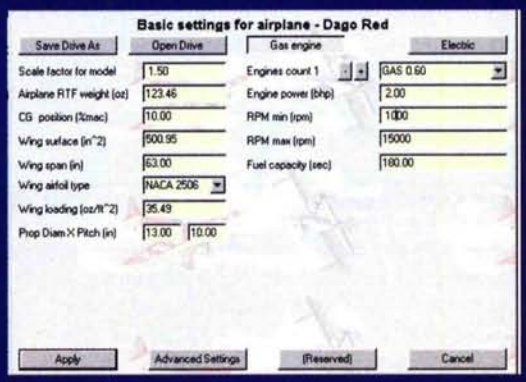


The "RC Interface" screen is where you can calibrate your transmitter to work with the flight simulator. This only takes a few minutes.

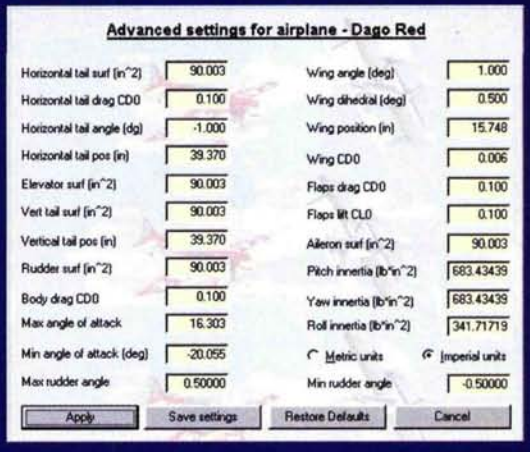
The first thing you need to do is to calibrate the various control functions so they will work with your transmitter. This is easy to do in the Controls section. When you call this window up, you see several buttons and slide switches. Start by clicking the first "Calibrate" button (aileron). Move the aileron stick left and right to its extreme positions and then click OK. Do the same for each of the other controls—elevator, throttle and rudder. The last button is for weapons! Next to each control is a Reverse button you can use to correct control direction. Unfortunately, you have to go into the sim and start a flight session to find out whether your controls are properly set up. Once everything is A-OK, save the transmitter configuration. You can load as many configurations as you like into the program and then simply click the "Load Configuration" button to select the transmitter you want to use.



Simulator speed, as well as several other variables, can be adjusted on this screen.



Above and below: you can customize your model using the basic and advanced setting screens.



YELLOW AIRCRAFT

SUKHOI SU-31M

by Chris Chianelli

Extras, CAPs, Staudachers, Giles; I like them all, but I love something different. And when that "something different" is powered by a round engine, I'm hooked. With its big radial engine, huge control surfaces, fat airfoil and coupling that's somewhat shorter than that of other competitive aerobatic types, the full-scale Sukhoi is both different and very cool. So is Yellow Aircraft's beautifully crafted, 24-percent SU-31M ARF. Having recently reviewed—and loved—Saito's gorgeous FA-170R3 3-cylinder radial 4-stroke engine (*Model Airplane News*, April 2000), I just had to match it up with Yellow's new Sukhoi. As have so many of you, I, too, have been searching for that "perfect model" throughout my RC modeling years. By that, I mean a design I love, in the size I like, matched with a reliable and powerful engine that I've also fallen for. All those elements came together with Yellow's Sukhoi and the Saito FA-170. I found the RC "Holy Grail"!

FLIGHT PERFORMANCE

During one of the several conversations I had with the people at Yellow Aircraft about the Sukhoi, they advised me to set the CG at 4¾ inches back from the leading edge at the root for the first few flights. As I became used to the model, the CG could be moved to 5 inches, as stated in the instructions.

With the big radial in the nose and the 1400mAh pack in the aft fuselage, this is almost exactly where my model balanced before fueling. At this balance point, the model tracked well and performed stall maneuvers without any problem. Since the FA-170 was already well broken in (having been featured in an earlier "Air Power" column), it took me only three short flights to get used to the new design. Then I moved the Sukhoi's CG back to the 5-inch mark, where it became a quick-reacting, smooth-flying aerobat.

• TAXIING AND TAKEOFF

Keeping the Sukhoi's tail planted on the ground while taxiing is easily done in either up- or downwind conditions because of its huge elevator surfaces. To keep the tail down, don't forget to feed in lots of down-elevator when you taxi in a strong downwind. With the Sukhoi's very blunt leading-edge wing and lots of low-speed thrust being supplied by the Saito and its big prop, the model wants to jump into the air. I suggest that you keep it on the ground for a bit. The wing has excellent slow-flight characteristics, but putting a plane into the air too early—before its control surfaces are fully effective—can have disastrous results, especially if you do so in gusty and/or crosswind conditions. With the Sukhoi's big, effective rudder, keeping it going straight down the runway while building up safe takeoff speed is easily done—so do it!

• AEROBATICS

With its big engine, big prop, an airfoil that reminds me of a double-taper Contender wing (see the "Field & Bench" review in this

I don't care how good the included plastic spinner was; only a Tru-Turn polished aluminum spinner was going to sit on the end of this engine and airplane combo. Tru-Turn has the exact spinner for the Sukhoi—ask your hobby shop.

issue) and huge control surfaces, the real Sukhoi reminds me of a "ride-in" fun-fly design. When control surfaces are set for maximum throw, Yellow's 24-percent version acts a bit like a fun-fly design—but one that tracks as though it's on rails; way better than any fun-fly design. Hmm; a fun-fly design that tracks like a pattern ship? I think that's a great combination and a somewhat accurate description of this aerobatic model. This thing will do whatever you want it to do—and I mean right now. It's designed to be thrown around the sky—hard! Yet it has a wing that hangs in there until the bitter end. Snaps, spins, top hats, avalanches, knife-edge—they're all at your fingertips. When I moved the CG back slightly, snap rolls got even prettier, and knife-edge required a bit less rudder input to maintain. With its big round cowl, 17-inch prop and fat wing, the Sukhoi does the most picturesque throttled-back down-legs. And when the down-leg is followed by the sound of the radial powering up as the colorful aerobat pulls level (inside or outside; doesn't matter), both sight and sound tell you you're at a full-scale airshow—totally awesome!

• LANDING AND SLOW FLIGHT

Although the Sukhoi's wing supplies plenty of lift at slower speeds, it will also bleed off airspeed quickly. Accordingly, keep some power on during final and also when making downwind turns in gusty conditions, or you'll suddenly find yourself in zero-airspeed emergency conditions; that's never good. The Sukhoi flared nicely before touchdown on the first few flights but flared even better and more slowly when the CG was moved back. With this design, 3-point landings often produced a bounce or two. Executing a main-gear wheel landing, however, and then letting the tail settle seemed to keep the model better planted after touchdown. I'm told this is a peculiarity of the Sukhoi. The only other one I've ever had was a Goldberg, and it had a much longer, pattern-plane-length tail moment. This Sukhoi's moment is true scale.

For smooth, slow flight, I dialed in 35-percent exponential on ailerons and elevator. With large control surfaces all the way around on the Sukhoi, you'll want some expo or dual rates. This way, you'll have a gorgeous scale aerobatic model that's smooth yet becomes wildly aerobatic on demand. Beauty, poise and ability; this model has it all—right down to a scale sound!

SUKHOI SU-31M

THE KIT

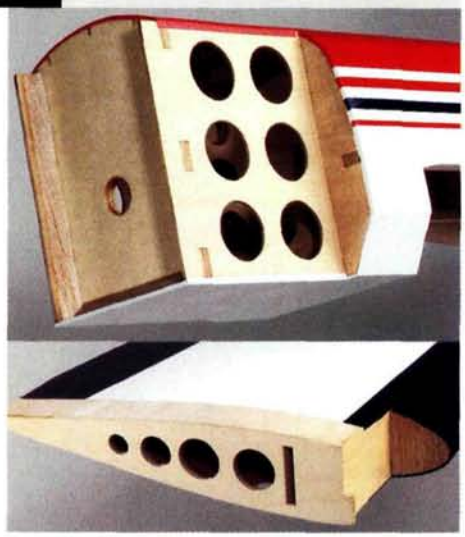
It's no secret; ARFs have been getting better and better. In some cases, it's almost to the point where you wonder whether you could have built the model any better yourself—at least, that's the impression I've gotten from some of today's ARFs, and I've been building radio-control airplanes for 31 years! Yellow's Sukhoi falls into this very high-quality league. In the categories of materials used and level of precision assembly, this ARF is right up there among the best of the best. From its structure of all high-grade balsa and plywood to the included hardware, this model is top-drawer throughout.

Great pains have been taken to design and build the model as an open-frame structure, and lightening holes have been incorporated in the fuselage and control surfaces wherever possible. Using the 1.70 radial for power, my finished version weighed in at 13 pounds, 7 ounces. If, for example, you opted for big-bore, single-cylinder power, 2-stroke or 4-stroke, anywhere from 1 to 1½ pounds would be stripped from the model's flying weight, putting it in the neighborhood of 12 pounds—light for a model of this size. Remember, this is a chunky, slightly lower aspect ratio design than some other aerobatic types, so the 72.5-inch wingspan somewhat belies the true nature of the model's size.

One problem that is showing up in some of today's ARFs is the glue. Not enough of it is being used in vital stress areas, but this is not the case with the Sukhoi; it has been assembled and sanded with care. Its covering is comprised of white MonoKote and red and blue Ultracote. The fiberglass cowl has been painted to match, while the red, white and blue louvers are vacuum-formed plastic parts that have to be glued in. I used every single bit of the supplied hardware except for the spinner, which was good, as far as plastic spinners go. Of course, this gorgeous model deserved a Tru-Turn polished aluminum spinner—and it got one! If I don't like a piece of hardware, I'll replace it and be sure to tell you why. Eventually, I changed the wheels, too, but that was only because of the rough grass fields I fly from here in the hills of Connecticut. The supplied wheels are lightweight and of good quality, but as they were exact scale size, they proved to be a bit small for the requirements of my airfield. Accordingly, I chose 3¼-inch treaded low-bounce wheels from Du-Bro.

Top quality throughout

As you can see from these photos, great care was taken during construction. What may not be so obvious is that grade-A balsa and plywood have also been used throughout. The fuselage former, stringer and sheeting have been meticulously fit together, as can be seen in the radio compartment view. The aft fuselage features open-structure construction techniques that can be discerned through the film covering when held up to the light. Further weight saving is accomplished by lightening holes, such as those shown here at the wing root and fuel-tank compartment sides. To seal off tank space, the holes in the sides of the fuel-tank compartment are later covered with iron-on film.



SPECIFICATIONS

Model: Sukhoi SU-31M

Manufacturer: Yellow Aircraft

Type: ARF scale aerobatic

Length: 63.5 in.

Wingspan: 72.5 in.

Wing area: 945 sq. in.

Weight: 13 lb., 6.4 oz.

Wing loading: 32.68 oz./sq. ft. with FA-1.70 (approx. 30 oz./sq. ft. with 1.2 to 1.80 4-stroke single cylinder)

Engine req'd: 1.20 to 1.80 4-stroke, or 1.08 to 1.50 2-stroke

Engine used: Saito FA-170 radial 4-stroke

Prop used: APC17x8N

Radio req'd: 4-channel with 6 servos (aileron, elevator, rudder, throttle)

Radio used: JR 652

Fuel used: Wildcat 15% Premium Extra

List price: $436

Features: built-up, all-wood ARF covered with MonoKote and Ultracote; built-up tail surfaces and control surfaces; D-tube wing construction with capstrips; painted fiberglass cowl and belly pan. Hardware and tank, wheels, spinner and tailwheel assembly included.

Comments: beautifully executed model using the highest-quality materials and weight-saving construction techniques throughout. Gorgeous scale appearance.

Hits

- Superbly built and finished ARF.
- Excellent materials and parts fit.
- Striking scale appearance.
- Excellent aerobatic ability.
- Good slow-flight characteristics.

Misses

- None.

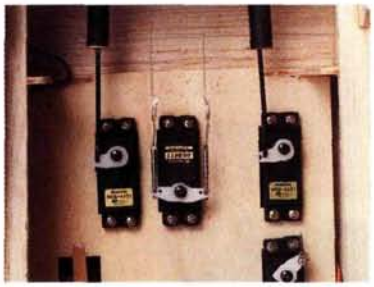
ASSEMBLY

A very detailed, 28-page instruction booklet containing 46 steps and more than 75 diagrams is supplied. The diagrams and written instructions, however, do not appear together. The first 15 pages of the booklet

This model deserves the very best; that's why I used this hand-crafted redhead from Pilots by Diane. Diane Chevalier has pilot figures to fit almost any scale need, and if she doesn't have it on hand, she'll custom-make it for you—headset and goggles included. Note that beautiful red hair; it's tied up and ready for some high-G aerobatics—just the kind the Sukhoi can dish out.

contain the words, and the remaining half contains the drawings. I guess this approach makes it easier to print the instructions in various languages. I simply divided and restapled the two sections so they could be viewed simultaneously, thereby eliminating the need to flip back and forth between drawings and words during assembly.

The Sukhoi is an absolute pleasure to assemble. Working with components that are made from top-grade materials and that fit together almost perfectly is a modeler's delight. Yellow Aircraft has always had a reputation for the high quality of its fiberglass jets and warbirds, and this tradition has been carried over to the ARF line. The only part I had to modify for a perfect fit was the wing hold-down tongue; I had to taper it slightly.



You don't want to skimp when it comes to servos. I used JR NES-4131s for the elevator halves and a digital DS 8411 with 150 oz.-in. of torque. If you're at all serious about aerobatics and have a model with a huge rudder like the Sukhoi's, a servo such as this is a must. The 8411 showed me the meaning of instantaneous and accurate rudder command. It will make you a better pilot.

The only modification I made to the model was the addition of extra hold-down blocks for the cowl to be screwed to. The cowl is very beautiful, but it is also quite long, and it needs extra fastening points. Try this; it worked very well (see photo below). Yellow's approach to control linkage is, in my opinion, the best: a separate servo for each elevator half (a great safety measure) and a pull/pull system for the huge rudder. For precise rudder-holding power in any position and at any flight speed, I used a JR 8411 digital servo. This thing will put any huge rudder exactly where you want it and will keep it there!

Many ARFs now come with prehinged surfaces, but this one doesn't; all hinging must be done by the modeler. I found this to be no big deal. Moreover, on occasion, I have found the prehinging on some ARFs to be slightly off-center. Like almost everything I found in the Sukhoi box, the supplied hinge points are of very good quality. You'll have fun assembling this one.

POWER

With the Sukhoi's strong, lightweight construction and thick airfoil, you can go in many directions in terms of power. With a 1.20 to 1.50 2-stroke, the finished model should easily come in at—or even under—12 pounds. This would put the wing loading at about 29 ounces per square foot—quite light for a large model. If you're like me and stump-pulling thrust is your thing, any powerful 1.20 4-stroke will fly this design more than adequately. This is a Sukhoi, however, and in keeping with its full-scale counterpart, it begs for ultimate big-prop pulling power. My recommendation? A Saito 1.50 or an Enya R1.55. With a Saito or Moki 1.80, though, you could probably make this model hover. As some of you know, when it comes to engines, I'm a little whacked out. For me, it was Saito's 1.70 radial or nothing! The 1.70 is about as powerful as the Saito 1.50, but the 1.50 has a very slight edge when turning larger props. If you do opt for the 1.70, you will need to mount the onboard battery pack (use a 1400mAh) behind the servos for proper balance.

Control horns, pushrods, pull/pull cables and tailwheel assembly are all supplied and are of good quality. The spring-activated tailwheel steering was not overly responsive; I'm thinking of going to more direct control rods.

I know some of you are thinking in terms of a 23- or 25cc ignition engine. Although such an engine would fly the Sukhoi around, it wouldn't have the juice to make this plane do what it was "born" to do: go wild in the sky!

CONCLUSION

The choices of scale model subjects available in super-high-quality ARF form are increasing daily. Some of these choices are starting to show up in large sizes. Yellow Aircraft's Sukhoi SU-31M is a case in point.

If you want an aerobatic model that goes together quickly, is fun to assemble, has true precision-aerobatic capabilities and will look awesome just sitting on the flightline, Yellow Aircraft has the plane for you. And if you want the Sukhoi's sound to be on a par with its red, white and blue scale beauty as it tracks through full-throttle up-lines and throttled-back down-lines, then power it with Saito's FA-170R—a machinist's work of radial-engine art. These two are a match made in modeler heaven.

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Saito FA-170R3 installation

Not only is the 170 a perfect match for the Sukhoi power-wise, but fitting it into the model is also quite easy. As viewed from the front, the engine has to be offset to the right, and relief cuts must be made in the right-side firewall triangle stock to make way for the two mounting lugs on that side of the spider mount. This is so the prop shaft will still be at the center of the cowl when 2 degrees of right thrust are added in. As luck would have it, the length from the thrust washer to the spider-mount lugs puts the prop/cowl clearance exactly where it should be. Again, a perfect match!

I wired up a parallel harness for the three glow plugs that led out to an external plug. I used a 1.2V, 7,000mAh single cell to light all three plugs. This setup is simple and very reliable. Note the three cowl-mounting blocks that I added to the top of the firewall to secure the cowl even more than is shown in the instructions. This is a very long cowl, and it can use the extra screw-mounting locations.

MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

Nostalgic Sunday flyer for electric or glow

SIG MANUFACTURING

R/C RASCAL

by Jim Simpson

When I first saw the R/C Rascal from Sig Mfg., I knew I had to have one. This is a beautiful aircraft—but you can see that for yourself. The shape of the airfoil, with its elliptical wingtips, gives the Rascal a Stinson-like look, and the transparent panels show off the construction of the craft. Details such as "no step" and "no push" decals, fuel-tank caps and a landing light complete the image and give this sport plane a nice, polished, semi-scale look. But the real story is that the Rascal flies even better than it looks. It's plenty fast and nimble yet very controllable at slower speeds. That by itself should be enough to motivate you during the building/covering steps, but when you discover just how easy this plane is to build, there is no way you'll be able to resist.

PHOTOS BY WALTER SIDAS AND BOB VAN TASSEL

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

The plane hand-launches easily into a realistic climb-out to pattern altitude. I also tried lifting off from our rough dirt field; takeoff was picture-perfect. This little plane accelerates rapidly, tracks straight and lifts off automatically because of the tail-dragger configuration and resultant wing angle of attack. It continued to accelerate in the climb and dared me to try some aerobatics. When it is time to land, just fly the standard rectangular traffic pattern; when you are lined up on final and you're sure you have the runway made, slowly pull the throttle control to idle and slowly feed in a little up-elevator so the plane slows without climbing. This changes the attitude and makes 3-point landings a cinch.

• HIGH-SPEED PERFORMANCE

High-speed performance is exciting. Of course, it's no pylon racer, but close-in, fast passes elicit "Wow!"s from flying buddies every time. Loops from high-speed passes can be surprisingly large, and rolls are crisp.

• LOW-SPEED PERFORMANCE

Low-speed performance takes a while to get into. This plane is sleek, and it takes a slow, steady application of "up" to slow it down. Once slowed, it is still very stable but seems to drop the right wing on stalling. Recovery is immediate; it simply flies out of the stall with little drama.

• AEROBATICS

Aerobatics start with the basic loop and roll, both of which the Rascal does well. A lot of the rest are some form or combination of these basic maneuvers. The Rascal rolls just fine with rudder only because the dihedral angle is right on. Now, when we combine the rudder and elevator commands with throttle control and timing, we can do some pretty amazing things, such as snap rolls. From high-speed level flight, pull straight up, then give it full right rudder, hold up-elevator and count the vertical snap rolls. After it stops and falls (stalls), it drops into a spin. Inverted flight is best done by flying straight toward yourself then pulling up into an Immelmann, but do not roll over on the top. Just push in a lot of down-elevator, and fly away from yourself. And by the way: left is still left, even when you're upside-down.

SPECIFICATIONS

Model: R/C Rascal

Manufacturer: Sig Mfg. Co. Inc.

Type: classic sport plane

Wingspan: 49 in.

Wing area: 324 sq. in.

Weight: 20 to 24 oz. (electric version with 7-cell 600mAh pack); 18 to 20 oz. (glow version)

Wing loading: 10.2 oz./sq. ft.

Length: 32½ in.

Radio req'd: 3-channel (rudder, elevator, throttle)

Power req'd: Speed 400 w/gear-drive unit (electric version); .049 to .07ci (glow version)

Power used: Maxx Speed 400 with a Graupner 2.33:1 gear drive

Speed control: Viper Model Products Micro Demon 52 ESC w/BEC

Prop: APC 9x6E

List price: $79.95

Features: laser-cut balsa and ply parts, windshield material, ABS wheel pants, preformed landing gear, complete accessories package, detailed decal sheet, full-size rolled plan and illustrated construction manual.

Comments: this plane has classic looks and fantastic performance. The bottom hatch allows easy access for batteries, and there is plenty of room up front for either gas or electric power. Most of all, the Rascal is fun to build and even more fun to fly.

HITS

- High-quality laser-cut balsa and ply.
- Complete parts package.
- Scale look.
- Flies great.

MISSES

- Early kits had minor misalignment of laser-cut parts (Sig has replacement parts).

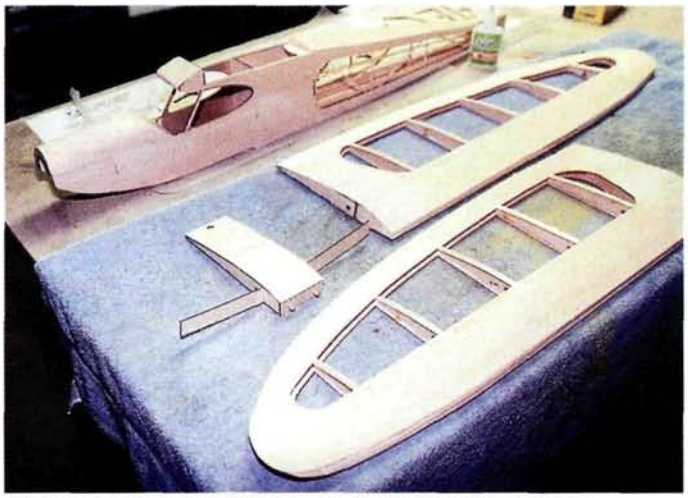
The finished Rascal is stylish and elegant with its Stinson-like wing, semi-scale details and the transparent panels in the covering that show off the model's construction.

CONSTRUCTION

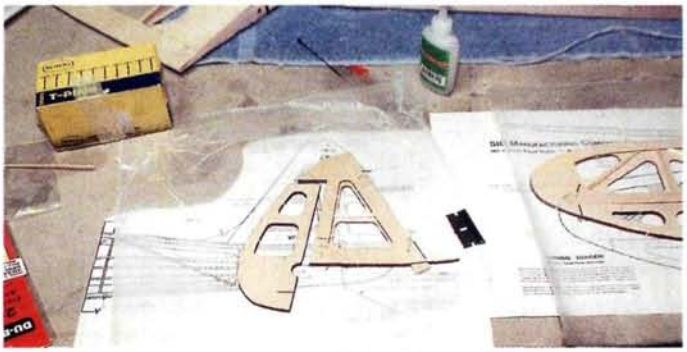
Inside, you'll find the construction manual, plan, decal sheet, windshield material and an accessories package that contains all the necessities—bolts, nuts, screws, tubing and hinges. Beneath all this is a stack of sheet wood with laser tracks outlining all the balsa and plywood parts. All the cutting and fitting work has already been done for you; the time and effort you save on this alone make this kit a bargain.

I found the order of construction to be very sensible, and I recommend that you follow it exactly; try to avoid the temptation to modify and/or "beef up" your plane. Having said that, let me share a few tips to help you avoid problems (just don't ask me how I know). I also recommend that you hang on to the unused portions of the balsa and plywood sheets that contain the laser-cut parts; if you wish to use the window technique shown in the artwork on the box, you will find them handy when you cut the covering material.

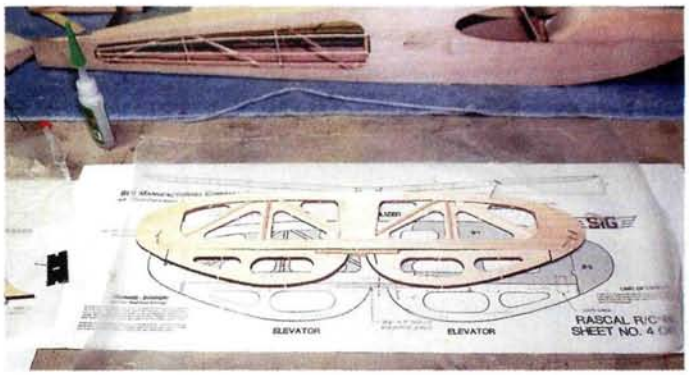
If you have an early kit like mine, some of the parts won't fit right. Sig has replacements, but you don't need to wait for them. Here's why: if the wing-rib notches do not match the plan, just move the capstrips over a tad to match the centers. If the outlines of the three layers of tail feathers do not match exactly, just align them on the hinge line, and sand the outer edges to streamline the shape. Do the same with the wingtip outline if necessary. When you build the wing panels, fit the plywood spar doubler behind the main spar. I thought mine would fit better in front, but I ended up having to reshape the center-section leading edge.



The Rascal's construction is easy, thanks to a smart design, a complete hardware package and excellent laser cutting. Most of the pieces hold themselves together even before glue is applied, so you won't need three hands for the job.



The tail feathers are composed of three layers. To make sure the fit is just right, align the sections along the hinge line, and sand the outer edges smooth and even.



Sig provides excellent instructions for the Rascal. Deviating from them isn't likely to make your plane any better—just heavier.

Two nylon clips secure the wheel pants to the landing-gear wire. Be sure to mount these as high as you can so they won't interfere with the wheel movement (I had to move mine).

The Rascal can be outfitted for electric or glow power. I opted for the Speed 400 geared motor, as Sig prescribes, but the manufacturer also gives recommendations for a .049 to .07ci glow engine. The e-powered Rascal is plenty quick enough for scale performance, and 600mAh, 7-cell packs easily produce 10-minute run times.

FINAL COMMENTS

What a plane! Perhaps the most impressive thing about this model is how easily it fills a variety of roles. It is equally at home flying fast or slow, performing aerobatics or just cruising. Add to that a stylish design with neat little scale touches, and what's not to love about the Rascal? I've already started a second model, just to ensure that I won't ever be without one. If only I could decide which color to use ....

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MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

TOP FLITE CONTENDER

by Vic Olivett

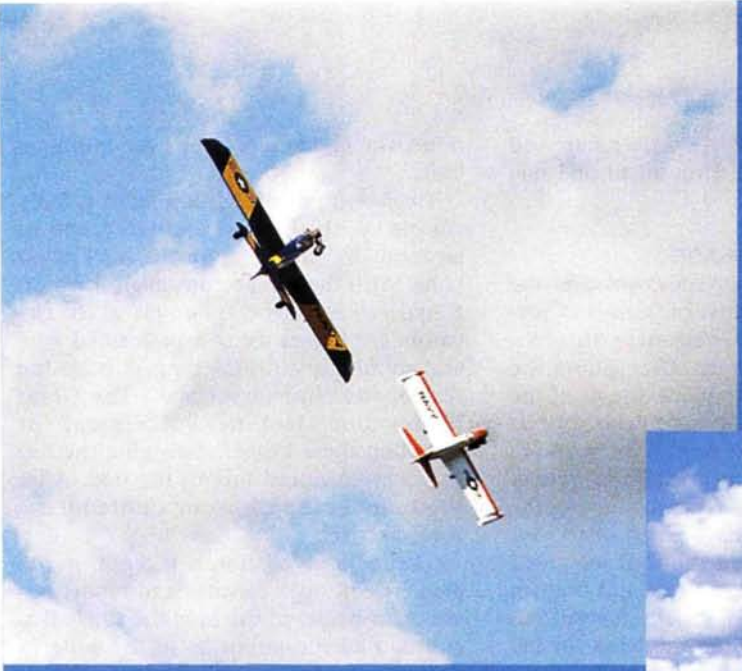
Back in the early '70s, the Top Flite Contender was one of the most popular Sunday sport-flyer kits. You could stroll onto almost any RC field and find a Contender or two. One of the great things about this design was that it was very easy to bash; we saw Contenders done up in just about every format imaginable. Variations on the basic model included high-powered singles, standoff warbirds and hot little twins—I even saw one done as a bipe. The Contender was such a successful design that when Top Flite stopped producing it, we started to build them from scratch. Later, when the Internet caught on, ads for "Contenders wanted" were a constant reminder of just how highly regarded this design was, even after all those years.

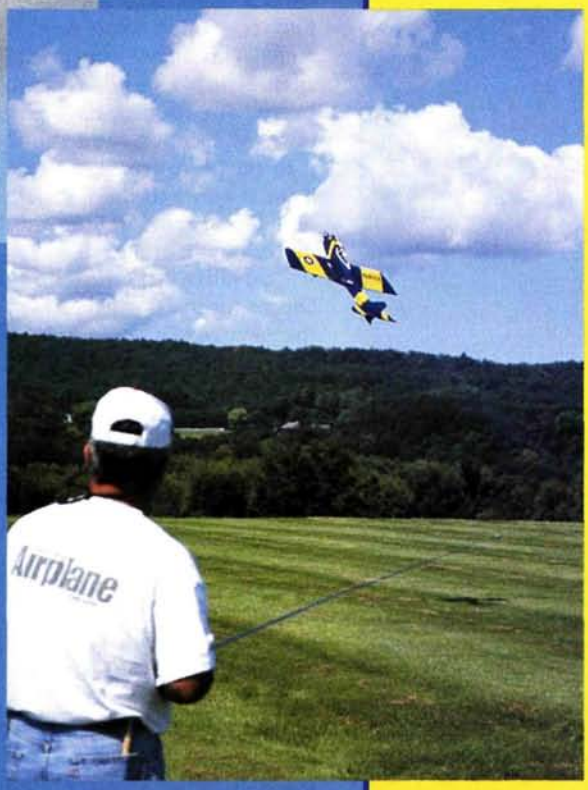
That enduring popularity has not gone unnoticed by Top Flite, and in response it has reintroduced a new Gold Edition of the famous Contender. The finished product may look the same as the original plane, but many changes have been made. The new Contender is lighter, stronger and easier to build, thanks to modern technology. But even so, much about the Contender remains the same. Most important, the character and performance of the classic design have been preserved, providing a new generation of modelers the chance to experience the virtues that made us love the Contender the first time around.

Like the old, the new Contender uses balsa and ply construction, and Top Flite has included a very complete hardware package that contains pushrods, clevises, landing-gear hardware, control horns, nuts, bolts and even the adjustable motor mount. As usual, Top Flite has done a great job on both the plan and the instruction manual. The 32-page instruction manual contains more than 90 pictures to illustrate the construction process. The plan is full size and well detailed, and construction is done over it. A quick note: if you want to save the plan and keep it in good shape, use the clear backing from MonoKote to protect it this material is resistant to CA.

WING AND TAIL FEATHERS

Construction begins with the tail surfaces Builders of earlier Contenders will notic that the newer version has built-up tai feathers instead of the solid plank construc tion of the original. Both the horizonta stab and vertical fin use ¼x⅜-inch stick con struction. The elevators are coupled with joiner wire and then hinged using C





The Comeback Kid looks like a champ

hinges that are included in the kit.

The 53-inch wing is built directly over the plan, and the construction begins with the sub-assemblies. Six of the ribs use ply doublers to help support the landing-gear blocks. Be careful on this step; it's easy to confuse the right from the left. All of the wing ribs have jigs that are later cut off; this works well to ensure a straight, flat, finished wing. The new Contender has the option of working flaps (it's actually one big flap). However, I found that I did have to trim the flap to get it to fit properly in the "up" position. The new wing design now uses two aileron servos; the old-style wing used torque rods or flexible pushrods running off one servo.

Once all the ribs and struts are in place and everything has been checked, install the webbing and glue the front and aft sheeting into place. Then turn the wing over and sheet the top. Top Flite has made the wing's construction very simple and straightforward. There are two styles of wingtip to choose from: the standard or the optional nostalgia tip. I chose to go with

FLIGHT PERFORMANCE

• TAKEOFF AND LANDING

The Contender tracks straight down the runway. With a little up-elevator, the climb-out is very smooth and crisp. With the Tower Hobbies Pro .46, this airplane will climb out of sight very fast. Once the Contender is in level flight, the power can be reduced back to half. With the controls set to Top Flite's specs, the Contender flies like a trainer, and all of the controls are very positive. Landing the Contender requires only a good final approach and a smooth descent with slight up-elevator to make a picture-perfect touchdown.

• SLOW FLIGHT

Slow flight with the Contender is just plain fun. With the flap fully deployed, the Contender will just about hang still in the air with a little headwind. The flap will cause the nose to pitch up slightly. With a little power, the plane is as responsive as ever and has no bad habits. I found it very difficult to get the Contender to stall at any speed other than just about stopped in the air.

• AEROBATICS

OK; time to kick the tires and light the fires, and you better hang on because this ain't your father's Contender. With the Tower Hobbies Pro .46 screaming at 13,700rpm, this thing will go vertical. On high rates, the Contender will roll with the best of today's high-performance planes. Loops can be done as tightly as you wish, and this model will do a very nice spin. Inverted, the Contender flies like its forebear; just remember that up is down and down is up.

All in all, this new Contender performs as well as or better than the old model in every category. Isn't progress wonderful?

SPECIFICATIONS

Model: Contender

Manufacturer: Top Flite

Type: advanced trainer

Wingspan: 53¼ in.

Wing area: 660 sq. in.

Weight: 6 to 6½ lb. (5 lb., 11 oz., as tested)

Length: 49.58 in.

Engine req'd: .40 to .60 2-stroke or .52 to .70 4-stroke

Engine used: Tower Hobbies Pro .46

Radio req'd: 4-channel (5-channel with flaps)

Radio used: Futaba 6-channel with 5 servos

Features: all-wood construction with CAD-designed parts; full hardware package including rod-in-tub pushrods, wire landing gear and engine mount; decal sheet; excellent, illustrated instructions.

Comments: everything that made the original Contender a favorite, plus modern advances in technology and construction that make it easier to assemble and more exciting to fly. This updated version will remind you of the good old days without making you long for them—the new Contender gives up nothing to the old version, and it gains quite a bit.

Hits

- Easy to build.
- Great die cutting.
- Well-executed plans and instruction manual.
- Excellent flyer.

Misses

- On my kit, the nose ring was smaller in diameter than shown in the plans.
- Flap has to be cut to fit the rear of the fuselage.

the standard. Build the center flap and ailerons, and set the wing off to one side for now.

FUSELAGE

The fuselage is built upside-down over the plan and is constructed of balsa and plywood, and like the previous steps, this construction is very simple. After gluing the fuse side-doublers into place, the fit of the parts is such that the rest of the fuse can be fully assembled before any of the parts are glued. This allows you to check for proper alignment before permanently affixing the pieces. The formers have punch-marks for pushrod location, and the rods are glued into position before the top and bottom balsa is glued to the fuse. The firewall has punch-marks for drilling the holes for the motor mount and nose gear.

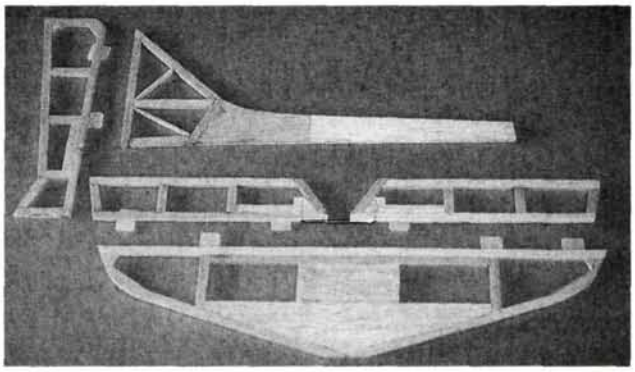
Top Flite recommends a .40 to .61 engine for the Contender, so I chose to use the new Tower Hobbies Pro .46. Once the engine has been attached to the motor mount and everything is secure, the fun begins. Glue four large balsa blocks into place, and shape them to the desired contour of the front end and to fit the plywood nose ring. Double-check the size of the ring to make sure it matches the plan; mine was a bit undersize for the recommended spinner. This process is no different from the old kit's, and I have to tell you that it requires some work with a rotary tool and a sanding block. But after all is said and done, the Contender does have a unique look.

Final assembly of the Contender is fairly simple. With the wing centered and in position, drill the holes for the ¼-20 nylon bolts. With the wing secure, align the horizontal stab and epoxy it into place. The elevators are joined using a preformed wire and are hinged with CA hinges, as are the rest of the control surfaces. The Great Planes Slot Machine works great for installing these hinges. Now glue the top and bottom dorsal fins to the fuse. After some final sanding, your Contender is ready to cover.

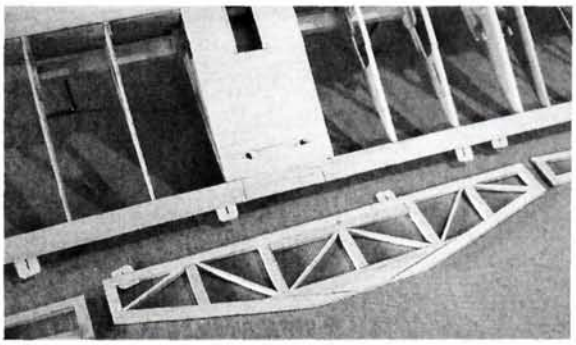
The radio installation is laid out on the plan. The throttle, elevator and rudder servos are installed in the fuse; the single flap and two aileron-servos go in the wing. A simple Y-harness is used for the ailerons, and the die-cut plate in the fuse is for the receiver and switch.

FINISHING

I used Top Flite blue and yellow MonoKote for the covering. If you follow the recommended sequence in the manual, you will find that the project goes quite well, and covering-material waste is limited. When the Contender is covered, the control surfaces can be installed and the hinges CA'd into place. Included in the kit are decals for dressing up the Contender, and I used a Great Planes polished aluminum spinner to better match the size of the plywood nose



Left: the tail feathers are now built up, replacing the solid plank construction of the earlier version. The weight savings contributes to improved balance and better performance all around. Bottom: Top Flite has given builders of the new Contender the option of working flaps (OK; it's really just one big flap). It works well, but it needs to be cut to fit the fuselage.



Left: the design of the Top Flite Contender is much as w remember it but with a few modern improvements: CAD-designed parts, interlocking construction and a complete hardware package help make it ready to cover in 10 to 16 hours.

That's my lifelong flying buddy and flight instructor, Vic, on the left with his stock Contender; I'm on the right with the modified Contender, complete with wingtip tanks, modified tail group and inverted O.S. FX .61, that Vic built for me. What a guy! Over the years, however, my piloting skills have become vastly superior to Vic's.

RC SURVIVOR: *$30 and 30 years*

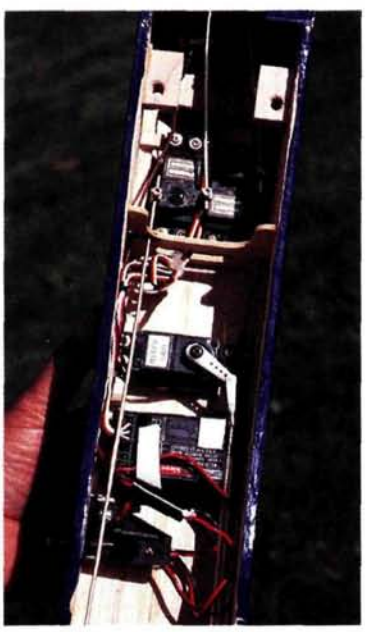
Back in 1971, when I belonged to the Kingston Aeromodelers, my flying buddy Vic (the ugly one with the hat) taught me to fly on a Sterling Mambo and an Andrew H-Ray. A month or so later, I acquired my very first low-winger: the Contender you see here. I purchased it used—but in good condition—from Vic's dad, Nick Olivett, for $30. I remember Mr. Olivett saying, "Son," (I was about 17), "the Tatone double-strut nose-gear/motor-mount unit alone is worth 25 bucks!" I love horse-trading. Anyway, the model was in much better condition when I first took possession of it from Vic's dad. This photo was taken after two and a half seasons of novice-pilot, "rough-duty" service and just before its final mission: the summer of '74's club fun-fly.

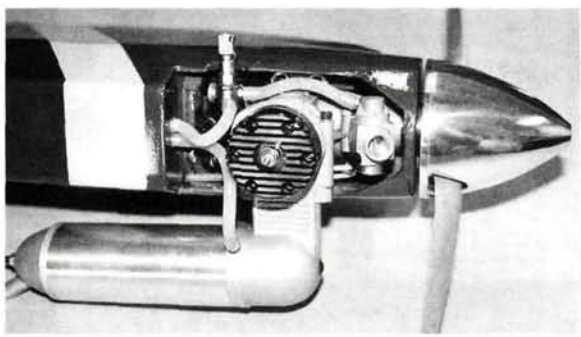
Does my club nickname, emblazoned in red letters, give you an idea of what this poor model lived through in my hands? The photo doesn't show the extra ½-pound of epoxy payload—built up from two years of "emergency repairs"—that the model was being asked to lift skyward, but trust me; it's there! (We didn't have CA in those days.) The black electrical tape holding the antenna wire should, however, serve as evidence of just how close the old Contender was to forced retirement: immediately following the 1974 Kingston Aeromodelers' Summer Fun-Fly event, to be exact.

This photo proves that, after years of limbo events and green-pilot hotshot blunders, the Contender survived. Why? Because—excellent maneuverability notwithstanding—it's so forgiving. Thanks to that fat wing, I never did crash it really hard; I just "flew it stupid," as the expression goes. My favorite stunt was the "carrier landing." You know; power up, nose high, tail in the grass. Often, the plane slammed down hard—so hard, the canopy popped off. Or was that the pilot ejecting? Once, while refueling, I thought I heard the Contender whisper, "Hey, Chris; in case you haven't noticed, I'm not a helicopter, you complete moron." I even flat-spun it (yes, it will spin if you move the CG far enough aft) into a corn-field many times—so often that I ran out of white MonoKote to repair the shredded wing bottom. As you can see in the photo, I did find some red floating around on the shop floor for the repair. Because of all this "dumb and fun flying" abuse, most of the rib bottoms had been crushed and repaired, some several times, with scrap balsa. In the end, I bet every single rib in the entire wing had a different Eppler value—a very desirable feature, I told Murray, the fellow club member I gave it to just before I left for college, just so he wouldn't charge me to haul it away. Abuse notwithstanding, the Contender just kept flying and flying and flying. The following year, on summer break, I visited the club field—and there was Murray flying my re-covered Contender. Who knows? Maybe retirement never was in the cards, and it's still in service somewhere to this day. The point is, the Contender is an awesome low-wing model for the novice pilot. And if you're feeling cocky, as we guys so often do, and you think you're the best pilot in the whole world, just increase the throws, move the CG slowly aft, and you, too, can join Crash Chianelli's Flying Circus. The Contender was great back then; it's even better today.

— Chris Chianelli

ring. Since the Contender is not heavy and all of the control surfaces are fairly small, standard servos are adequate for everyday flying. My Contender balanced out with the battery pack just behind the fuselage servos.





Left: radio-gear installation is laid out on the plans. The throttle, elevator and rudder servos go in the fuse, while the aileron servos (and one for the flap, if you opt for it) are in the wing. Above: Top Flite recommends .40 to .61 engine sizes, and the Tower Hobbies Pro .46 has the muscle to pull the Contender through any maneuver you can dream up.

CONCLUSION

While building the Contender, I found myself reflecting on years past—this was the plane to own back in the early '70s. It was fun in its stock form, and it was a great kit to bash. It developed a reputation and a following that few other kits can match. To live up to that reputation, the people at Top Flite had to do a great job with the new Contender, and they have pulled it off. With all of the new construction techniques and improved quality, the new plane is easier to build than the original, and it meets or exceeds the performance levels of its predecessor across the board. As it does with all of its kits, Top Flite has done its homework and has produced a great-looking and very good flying model in the new Contender. It will make a very good choice for both novice and experienced fliers.

Futaba Corp. of America, *exclusively distributed by* ***Great Planes Model Distributors Co.;*** *www.futaba-rc.com.*
Great Planes Model Distributors Co., *P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*
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MODEL AIRPLANE NEWS
FIELD & BENCH
REVIEW

Sporty ARF trainer

NORVEL

Neofun UCan-2

by Randy Randolph

The first time I saw the Neofun UCan-2 ARF, it was in the hands of Ed Stevens, the man behind Norvel, its distributor. We were attending the April 2000 Toledo Weak Signals show, and the UCan-2 was one of the few airplanes that impressed me. It had a nostalgic yet modern look along with smooth lines that blended into a cowl that didn't hide the engine and make fueling and maintenance difficult. It was my idea of what a sport airplane should be. Now that I have assembled and flown it, I have not changed my mind one little bit!

I am an old-timer who thinks ARF airplanes are very good things (most of them, anyway) and the UCan-2 is one of the better ones. The kit comes with almost everything necessary to assemble the airplane, except the engine, fuel tank, radio and shop materials such as glue, sandpaper, screwdriver set, etc. It also includes pieces that fit without additional

A complete hardware package and formed landing gear are included in the kit.

SPECIFICATIONS

Manufacturer: Norvel

Model: UCan-2

Type: sport ARF

Wingspan: 41 in.

Wing area: 365 sq. in.

Weight: 24 oz.

Wing loading: 13 oz./sq. ft.

Length: 28 in.

Engine req'd: .049 to .074ci

Engine used: Norvel .074

Radio req'd: 4-channel w/4 servos

Price: $79.99 (basic kit); $119.98 (w/BigMig .061 engine combo); $129.98 (w/Revlite .074 engine combo).

Features: factory-finished fuselage, wings and tail surfaces and a full hardware package, including wheels installed on tricycle landing gear as well as a formed windshield. Requires an engine mount and a fuel tank.

The Norvel Revlite .074 gives the UCan-2 a lot of power. The prop that worked the best for this engine/airplane combination was a 7x3.

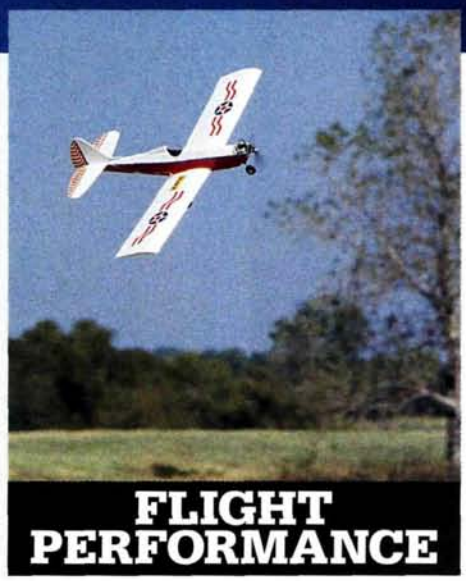
Comments: this is an easy-to-build ARF that provides enough assembly to instill pride in the builder. The finished airplane is attractive, and it handles well on the ground and in the air.

Hits

- All parts are well built, and assembly is straightforward.
- Hardware is of good quality and matches its use.
- Instruction manual is well illustrated and complete.
- The finished airplane is a pleasure to fly.

Misses

- Mounting holes in firewall were plugged with epoxy.



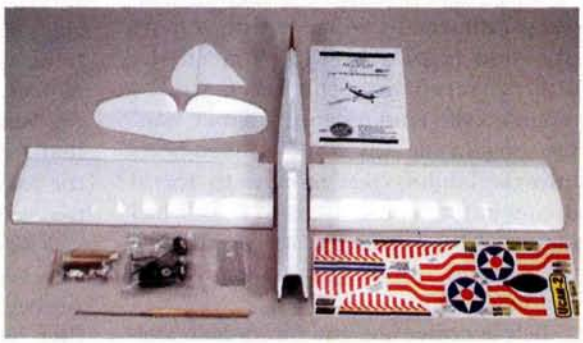
FLIGHT PERFORMANCE

On the first flight, the plane took off in less than 10 feet! Before things got out of hand, I reduced throttle and trimmed for a level flight. The trim was well within the transmitter's range. At half throttle, the UCan-2 is a very easy-flying airplane, and I spent most of the first flight at less than half throttle. With some fuel left, I wanted to see what this airplane would do, and I wasn't disappointed! This airplane will pull off just about any sport-type stunt you could imagine. Loops, rolls, snaps and spins are done with ease and grace, and I did most of them under full throttle. With all the power available, you can achieve almost unlimited vertical flight. This is a frisky, fun airplane!

Interestingly, at reduced throttle just above idle, the UCan-2 is a very gentle, easy-to-land, trainer-type airplane. It stays in the air at relatively high angles of attack and maintains a slow speed with no tendency to drop a wing. The ailerons are effective well into the stall, which makes stall landings ideal. Unfortunately, the model settles in so nicely that it's easy to drag the tail when you land. That's hard on the plane's covering!

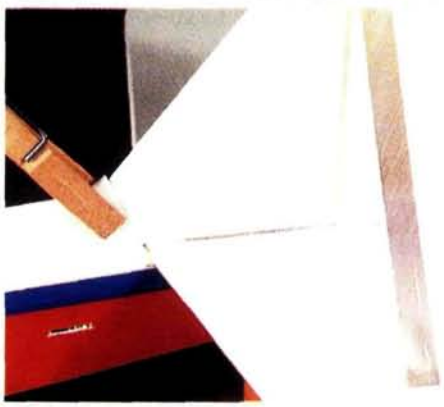
I confess that in the course of my playing, I managed to drag a wingtip through the grass, and this resulted in a very nice cartwheel! The hard landing removed the wing, fin/rudder and stab/elevator from the fuselage, and it took me almost half an hour to glue the tail back into place and replace the aft wing-holding dowel. If I had brought glue, it could have been fixed at the field!

sanding or carving, a well-illustrated and understandable instruction manual and a very attractive decal sheet that you can use to create any pattern you like. If you buy the combination package, even the engine is included! This, however, is not quite a click-and-go ARF. There is still some work to be done; not a lot, but enough to give you a sense of accomplishment when you've finished.

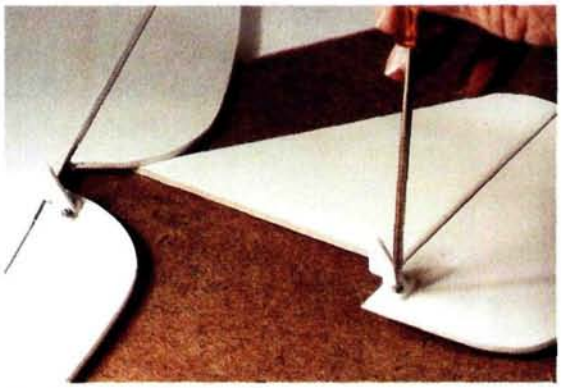


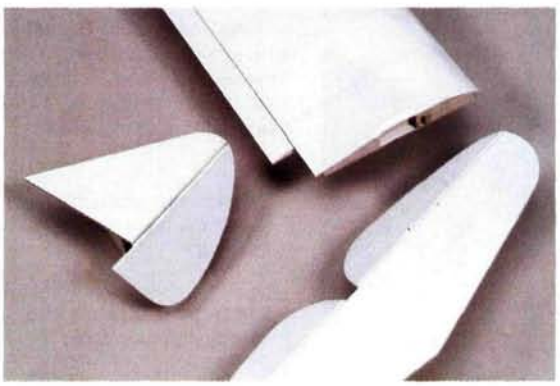
PUTTING IT ALL TOGETHER

The first thing to do before you assemble the wing halves is to mount the aileron hardware. The ailerons are already mounted and hinged to each wing, so this step seemed tricky, but it really wasn't! I simply slipped the torque-rod mount into a ready-made slot while



Since the leading edge of the fin goes into a fairing on the fuselage, you must remove some covering from the fin where it touches the fuselage. A clothespin is a handy clamp for this assembly. The square holds the fin vertical to the stabilizer that has already been cemented into place.





Top: it's easier to install control horns on the control surfaces before, rather than after, they have been attached to the fuselage. Above: the control surfaces come hinged.

simultaneously sliding the anchor into the aileron. The instructions suggest practicing before applying the epoxy, and that proved to be a good tip. Once you understand the slip-twist, it's no trouble at all.

After I had installed the aileron hardware, I attached the wings with a hefty plywood joiner. Before I placed the aileron servo into the servo well, I mounted the landing gear. I didn't want the servo in the way while I drilled holes into the landing-gear mounts to accept the mounting bracket screws. Once I had mounted the landing gear, I completed the wing by installing the aileron servo and its pushrods.

Before cementing the fin, rudder, stab and elevator to the fuselage, I installed the control horns on both movable surfaces. That is easier to do when the fuselage isn't in the way.

Although the kit included most of the necessary engine and nose-gear mounting hardware, and the firewall is drilled with the required mounting holes, installing the nose gear and the engine were the most time-consuming steps for me. This was because while fuelproofing the cowl and firewall, the manufacturer almost completely plugged the mounting holes with epoxy! So I had to first locate them and then drill them out before I could install the gear mount. None of this was too difficult, except that the firewall, nose gear and engine mount are all the same color: black! The holes almost disappeared when I tried to match the holes and screws, so I suggest you use a good light!

After assembling the throttle and nose-gear steering lines through the firewall, installing the 2-ounce fuel tank is a breeze. I wrapped the tank in foam, connected the fuel lines, fed them through a ⅜-inch hole in the firewall and pushed the tank into place.

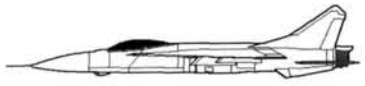
A word of advice about the radio system: use mini equipment. Because there's limited space in the cabin area over the wing, installation is easier if you use miniservos and a 270mAh battery pack. I used FMA Direct sub-microservos. Small servos will also work, but their installation might require some head-scratching to fit everything inside so that they don't interfere with each other. To get the proper balance, I installed the battery pack just behind the fuel tank, and the servos are just behind the first bulkhead.

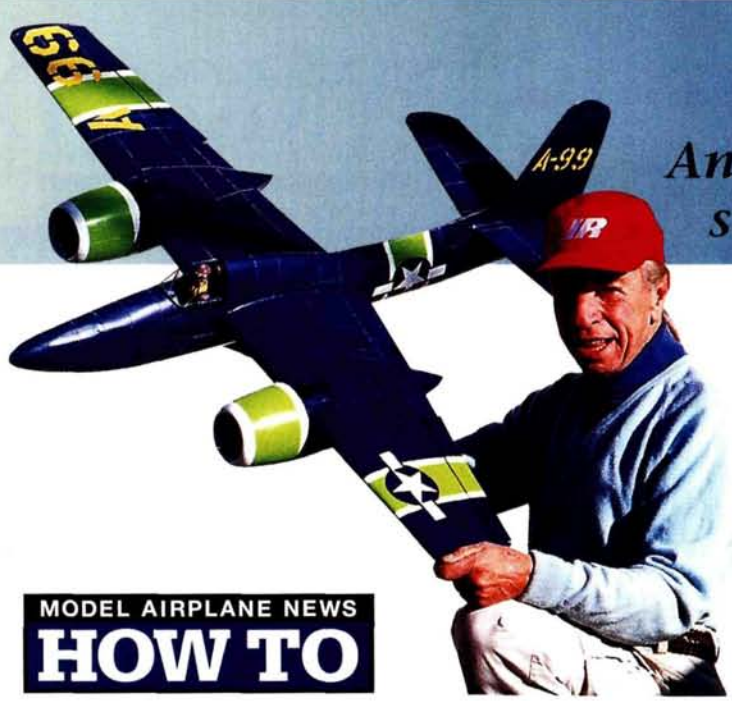
The last detail before this plane is complete involves the decal sheet. The sheet is very slick, colorful and easy to apply, and it offers a number of different trim combinations for the creative builder. I simply followed the picture on the box for the between-the-wars look that I wanted; you, however, can tweak the facade of your creation in any way that suits you!

I like this airplane. It looks good and flies very well. It's also a good plane to get beginners into the air, provided that they have good instruction. I can't say enough good things about the Norvel line of engines, and when Norvel designed an airplane to go with it, it did a pretty darn good job! As a bonus, the UCan-2 is a tough little bird, too!

FMA Direct, *9607 Dr. Perry Rd., Unit 109, Ijamsville, MD 21754; (800) 343-2934; fax (301) 831-8987; www.fmadirect.com.*

Norvel, *P.O. Box 3459, San Luis Obispo, CA 93403-3459; (800) 665-9575; (805) 547-8360; fax (805) 547-8365; www.norvel.com.*





An easy technique for superior results

MODEL AIRPLANE NEWS
HOW TO

Strip-Plank like a Pro

by Henry Holcomb

Scale modelers often deny themselves the pleasure of building their favorite airplane because they are afraid of the planking that would be involved. Others find alternative ways of accomplishing those elegant but often complicated shapes common to so many scale models. But I maintain that when proper techniques are used, planking is the fastest, the easiest and the lightest method of all.

The plain truth is that many modelers avoid planking simply because their first effort—often their last—was a mess; the planks didn't fit; some planks were higher than others; and there were gaps that had to be tediously filled with little splinters of wood and great gobs of filler, followed by hours of sanding to a decent shape. But, it doesn't have to be that way, as I will show.

The author and his electric-powered F7P Tigercat for which the nacelles were designed.

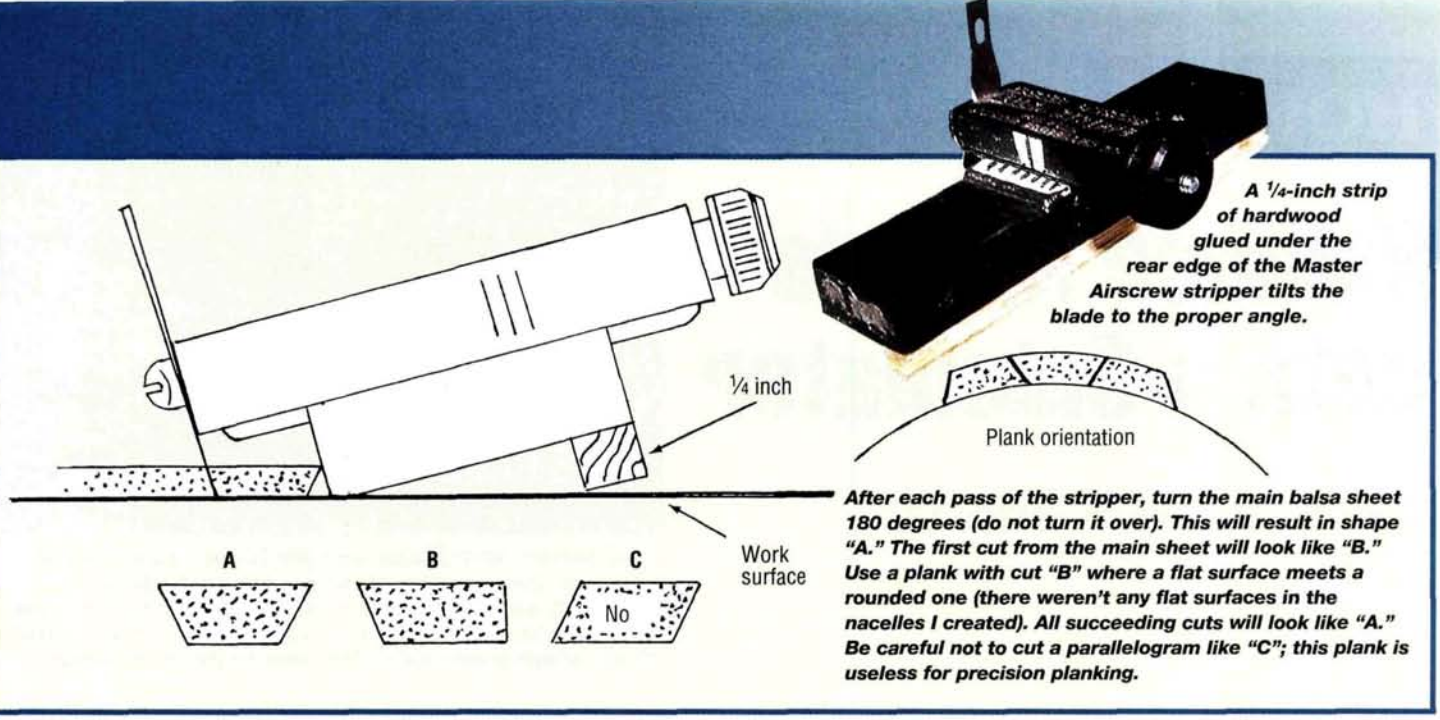
A planked motor nacelle. This technique is light, strong and easy.

The motor nacelle shown here is one of two that I planked for my scratch-built, electric-powered F7F Tigercat. It is 12½ inches long and weighs only 1¾ ounces. Circumferences are 13 inches at the nose, 16 at the middle and 6 at the tail. Its double curvature made sheeting out of the question. After I had constructed the frame, I spent only one evening planking it.

If you want the job to go smoothly and be hassle free, you must first strip precise planks. Don't let the word "precise" scare you. Using the techniques shown here, it is easier than you think. The first thing you must do is modify your stripper. I use a Master Airscrew stripper because I have found it to be the easiest to modify for this purpose. Be careful how you adjust the blade; it shouldn't dig into the work surface. This is true with any kind of stripping. Loosen the setscrews that hold the blade, then rest the stripper on a hard surface, preferably metal. Let the tip of the blade barely touch the surface; then tighten the screws. Don't worry about the blade not cutting completely through the balsa; it doesn't have to, and you won't leave any cut marks in your work surface. The drawing illustrates the end view

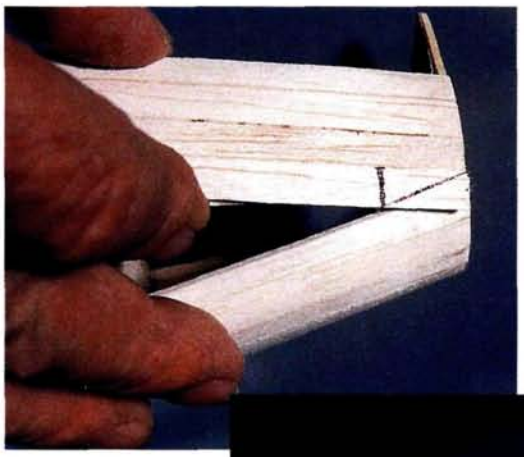
The frame is ready for planking. The work will go much faster if you estimate the number of planks you'll need and cut them all at once.

Nine strips are in place. To avoid warping the frame, start with the center strips on each side. I started with the two side center strips, plus the bottom center strip. It is important to alternate between an upper and lower plank as you glue them in. Note how the strips are bent sideways. This is accomplished by squeezing them firmly together until the glue sets. With strips wider than 3/8 inch, this sideways bending would be difficult, if not impossible. Eventually the strips will come together at the small end of the nacelle, with a small triangular opening between them. If they don't, cut a narrower strip to make it so.



A ¼-inch strip of hardwood glued under the rear edge of the Master Airscrew stripper tilts the blade to the proper angle.

After each pass of the stripper, turn the main balsa sheet 180 degrees (do not turn it over). This will result in shape "A." The first cut from the main sheet will look like "B." Use a plank with cut "B" where a flat surface meets a rounded one (there weren't any flat surfaces in the nacelles I created). All succeeding cuts will look like "A." Be careful not to cut a parallelogram like "C"; this plank is useless for precision planking.



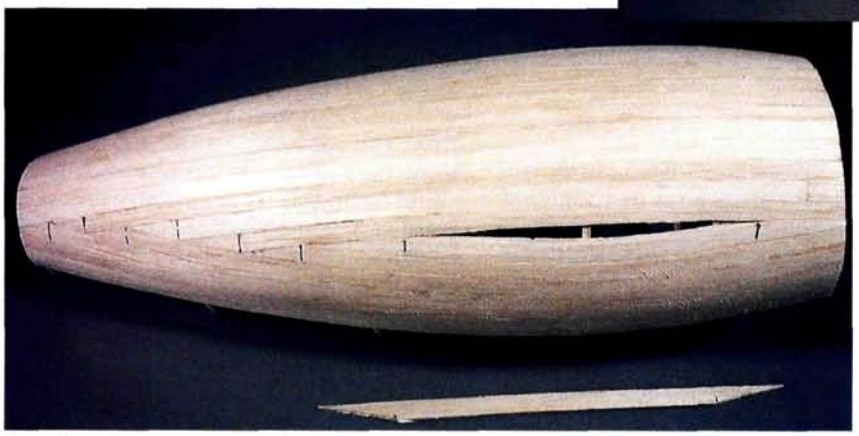
At this point, you must cut an angle on the end of each plank to make it fit at the small end of the nacelle. The plank in the photo has been marked for cutting. If you measure the length of this cut, you will find that you can cut the ends of several additional strips and they will all fit. Use a steel straightedge to mark the cuts.

of the planks after they've been stripped and shows the method used to arrive at this shape. Strip all the planks at once, swiveling the balsa sheet back and forth, end for end, as described under the drawing, strip as many planks as you think you will need.

You may think that cutting wider planks will make the job go faster ... wrong! Wide planks are harder to fit and they lack the necessary flexibility for precision planking. You see, the planks must bend, not only lengthwise over the end-to-end curve of the nacelle, but also sideways to butt snugly against one another. The planks in my Tigercat nacelles are 3/8x3/32 inch. If you're planking a smaller form, go down to ¼ inch wide.

Because you must squeeze and hold each plank in a sideways bend to mate it with its partner, any glue other than CA will take too long to set. Use CA, but not much. With the perfect fits made possible by the side taper of the planks, you won't need much; think light. Be careful that the taper on each successive plank is properly oriented to its neighbor

The end cuts are marked so that you can see that they are all about the same length. This will be true until the planks come together at the large end of the nacelle. Now it's time to install the last two planks.



I neglected to photograph the next-to-last plank before installing it, so I made a duplicate and placed it above the nacelle. Note that the cuts on each end are identical. The remaining opening in the nacelle tells the story of the last plank. Here you will need to do some sanding. Tip: work on one end until it fits snugly, then work on the other end. Press the plank in and glue.

before you glue it. The last strip is the one that separates the men from the boys. Take your time.

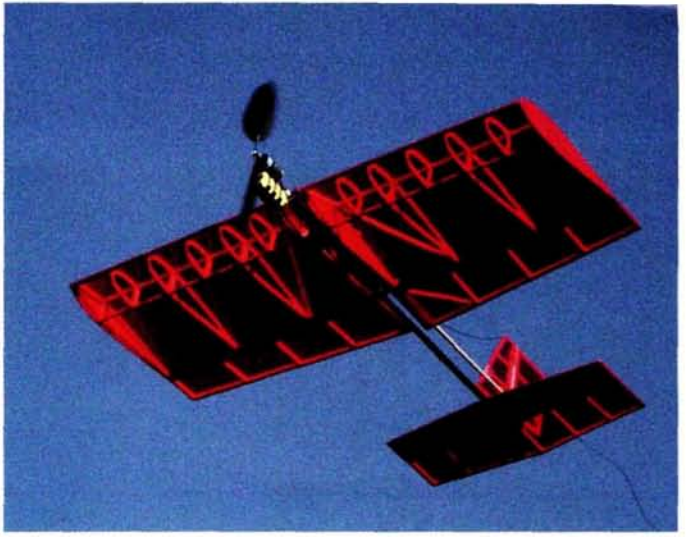
When you finish, almost no filler should be required. If you do add filler, it will only be because you are seeking absolute perfection. And you may not believe it—until you try it—but with this technique, perfection is possible.

Master Airscrew; *distributed by Windsor Propeller Co., 3219 Monier Cir., Rancho Cordova, CA 95742; (916) 631-8385; fax (916) 631-8386.* ✚

Balance Models with a Calculator

Simple equations to set the CG

by Jef Raskin

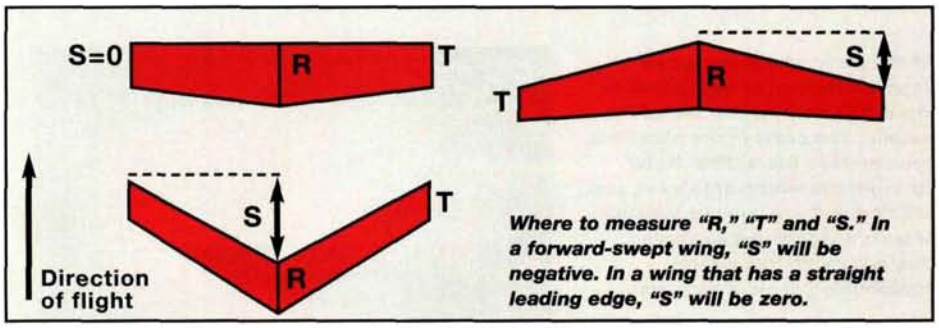


I modified this Bill Griggs Models Little Tiny into a 24-inch-span flying wing, then used the calculations below to balance it. Powered by a DC 1717 motor and 8-cell, 50mAh Ni-Cds, the wing is a perfect backyard or indoor flyer; see the March 2001 issue of RC MicroFlight (www.rcmicroflight.com) for the how-to article.

Many graphical methods have been published about finding the right balance point for that all-important first flight. With modern calculators—especially the programmable kind—you can put in a formula that will give you the right answer much faster because you don't have to make a scale drawing—or any drawing, for that matter. You can also put these formulas into a spreadsheet or a computer program.

My son, Aza, gets ready to hand-launch the Little Tiny flying wing.

The method works for conventional monoplanes and flying wings with straight leading and trailing edges. You need to know only the root chord (R), the tip chord (T), and the amount of sweep (S) at the leading edge of the wingtip.



Where to measure "R," "T" and "S." In a forward-swept wing, "S" will be negative. In a wing that has a straight leading edge, "S" will be zero.

Here's the formula in a nutshell. First, you calculate a number that I call "Q":

$$Q = \frac{RxR + RxT + TxT}{6 \times (R + T)}$$

Now that you have Q, you can calculate another number. We'll call it "P."

$$P = 1 - \left(\frac{4xQ - T}{R - T}\right)$$

When you have the magic numbers P and Q, it is really easy to find the distance "D" back from the leading edge of the wing at the fuselage centerline, where a monoplane should initially be balanced.

$$D = Q + SxP$$

I say "initially balanced" because this is a guaranteed safe place for a first flight. If the model is not a trainer, you may want to move the balance point back, a little bit at a time, to improve elevator response. This method works with conventional configurations and with flying wings intended for RC. Free-flight models, biplanes and canards may require different calculations.

AN EXAMPLE

As an example, a flying-wing model has a root chord of 12 inches at the fuselage centerline, the tip chord is 9 inches, and the leading edge sweeps back 6 inches. Where should you balance this flying wing so that it is stable? R = 12, T = 9 and S = 6.

$Q = (144 + 108 + 81) / (6 \times 21) = 2.64$
$P = 1 - [(4 \times 2.64 - 9) / 3] = 0.48$
$D = 2.64 + 6 \times 0.48 = 5.52$

The distance back from the leading edge of the wing (at the fuselage centerline) at which this wing should be balanced is 5.5 inches (you don't need to measure hundredths of an inch!).

NOTE FOR AFICIONADOS

"Q" is the distance from the leading edge at the centerline to the mean aerodynamic chord. "P" is the fraction of the distance from the root toward the tip that you must travel along the mean aerodynamic chord to find the mean aerodynamic center of each wing panel. If you prefer these equations in standard mathematical notation, they are:

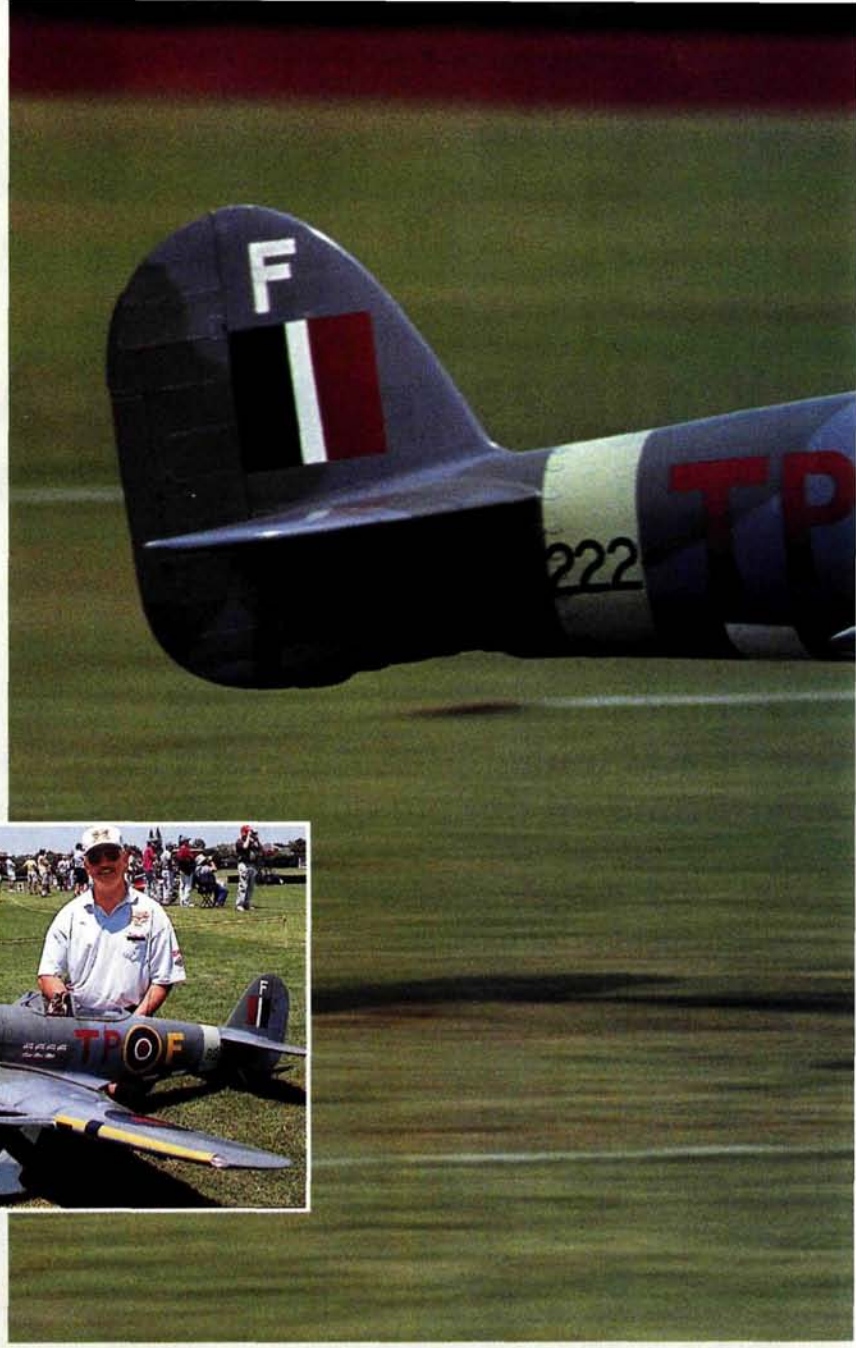
$Q = (R^2 + RT + T^2) / 6(R + T)$
$P = 1 - [(4Q - T) / (R - T)]$
$D = Q + SP$

Bill Griggs Models, 3137 Whitelaw Rd., Canastota, NY 13032; (315) 697–8152; www.aiusa.com/bgriggs.

MODEL AIRPLANE NEWS
READER'S
GALLERY

by the staff of Model Airplane News

HAWKER Typhoon MK IB



SPECIFICATIONS

Model: 1/5-scale Hawker Typhoon Mk IB

Designer: Roy Vaillancourt

Wingspan: 97 in.

Length: 79.5 in.

Weight: 47 lb.

Power: Quadra Q-75 w/homemade muffler

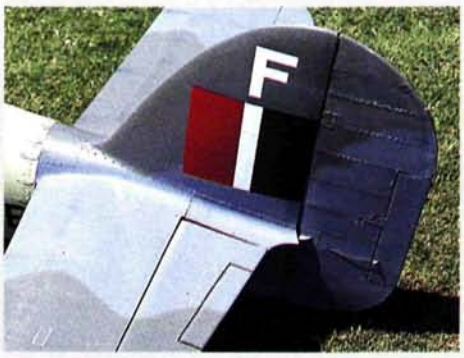
Prop: Zinger 24x12

Radio used: JR 8103; 9 heavy-duty servos; 6V airborne battery pack

The Hawker Typhoon was intended to be the successor to the already famous Hawker Hurricane high-altitude interceptor, but with its very rugged construction, the Typhoon had comparatively poor performance at higher altitudes and was therefore destined to a career in the roles of low-level interception and ground attack. Cannon-armed Typhoons were designated "Mk IB" and had an armament of four 20mm Hispano cannons protruding from the wings with faired barrels, although the Typhoon's most formidable weapon was a 27kg projectile rocket. Eight of these could be carried on the underside of its wings to provide a most formidable flying arsenal. Later in WWII, Typhoons accompanied Allied troops from the beachheads of Normandy right into Germany. Soon after V-E Day, the Typhoon force was put out of service, and today only one example of this formidable fighter survives.

Roy Vaillancourt, owner of Vailly Aviation, built this model, which has done fairly well in its first few outings. At Top Gun 2000, it finished seventh in Designer Scale and fifth in the 2000 Scale Nationals. It is an all built-up model that's made mostly of balsa and aircraft-grade birch and lite-ply using Roy's typical no-frills construction methods. The entire airframe is sheeted in balsa: 3/32 on the wings and fuselage and 1/16 on the fin and tailplane parts.

The rudder is covered in Super Shrink Coverite (the full-size ship had a fabric-covered rudder). All this balsa is covered with Dan Parson's fiberglass cloth and polyester resin. Hank Likes designed the electric jackscrew retracts



according to Roy's requirements, and Roy designed and built the main struts and wheels and the mechanical tailwheel unit. The finish color is PPG automotive lacquer. All markings are painted on using Hobby Poxy or Testor's Model Masters paints.

Special operating features include fully proportional split flaps, operating landing lights, a functional sliding canopy and operational pilot's step (the step extends and retracts as the canopy opens and closes). The Typhoon has excellent ground-handling qualities with no tendencies to ground loop or nose over. On grass, this model is a joy; on pavement, it requires a little more attention to make a smooth landing. After all, the full-size airplane was designed to fly off grass, and it never saw pavement. Roy's Typhoon has excellent flight-handling characteristics, due in part to its very thick wing, which is typical of the full-size beast. It will slow down to just over a crawl with the gear and full flaps down. ✈

BP-100

A giant-scale sport plane with a bush-plane flavor

by Ron Daniels

In spite of its large size and appetite for aerobatics, the BP 100 looks every bit a 1960 to 1970s-era high-wing tail-dragger. "BP" means "bush plane," and the model is based on what I think the ultimate modern bush plane would be like. In other words, it is a make-believe, sport-scale high-wing monoplane with an all-aluminum stressed-skin fuselage, fabric-covered tube-frame tail and aluminum D-tube fabric-covered wings that never existed. I hope you agree that it sure does look as if it could be scale.

With its trainer wing airfoil, the model is very gentle at the stall, and when powered with a large engine, it will lift an immense payload. It can easily be flown by anyone who can safely fly a trainer. Even on a paved runway, it does not have the strong torque reaction that's usual with a powerful tail-dragger.

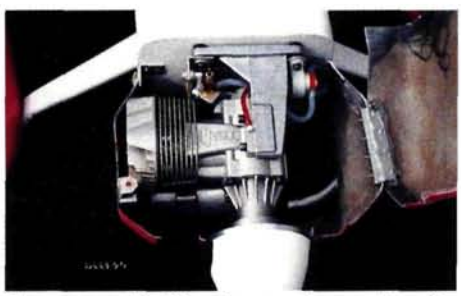
The BP 100 can be assembled easily at the field, and with the spinner removed, it will fit into a short-bed mini pickup with the tailgate closed. The wide cowl can easily swallow a large array of big engines without having a cylinder sticking out of its side. To allow easy access to the powerplant for adjustment and maintenance, I hinged the top half of the cowl. Basically, the model is a simple 4-channel job, and because of its low airspeed, only the elevator requires a giant-scale servo; standard servos can be used on all the other control surfaces.

CONSTRUCTION

Detailed, step-by-step instructions are included with the plan, so I will only go over the highlights here.

• **Wing**. Construction starts here. The prototype's wing is fully sheeted, but the plan now shows an open-bay wing with D-tube sheeting front and back. The panels plug into the fuselage and have a wooden-box web built into them; this accepts two wing-joiner blades. The panels have two I-beam spars with spruce upper and lower spars and vertical plywood webs. The box web is built into the panel before you add the wing sheeting, and for additional strength, I wrapped the box with carbon-fiber tow.

The plan shows all the details for the ailerons, the web box and blades, the strut attachment points and all the rib patterns. It also includes a complete bill of materials for all the wooden parts you have to make and all the hardware you'll need. The tail surfaces are made using ½-inch-square and ½x¼-inch balsa stick stock.



The extra-wide fiberglass engine cowl easily houses the big SuperTigre 4500 glow engine. The cowl is hinged for ease of maintenance.

The horizontal stab is reinforced with a ½x¼-inch plywood brace at its TE. For strength, the rib strips in the vertical fin and in the stab that support the functional tail-support wires are made of ½-inch-square spruce.

• **Fuselage**. The four main fuselage longerons are ¼-inch-square spruce, and all of the vertical supports and diagonals are made of ¼-inch-square balsa. The main fuselage structure (truss box) is sheeted on the sides with ⅛-inch balsa. Once the two sides have been assembled, you start to join them at the tail and work forward, adding the crosspieces as you go. Do this with the sides placed upside-down over the top view on the plan.

After installing the horizontal diagonal braces, add the upper fuselage formers and the plywood cabin side frames. The bottom of the fuselage is sheeted with 3⁄32-inch balsa, and the forward portion around the main landing gear is extended with formers. The plan also shows a secondary landing-gear support well aft of the main gear support. If you would like to attach floats to your model (and which bush pilot wouldn't), just bolt the float struts into place. If you don't want floats, simply sheet over that part of the fuselage bottom.

In the bottom of the fuselage, I made a small access panel that allows me to get to all the servos and the radio gear. The wing blades are glued permanently into place. They make great tie-down points for transportation, and—most important—they set the wing incidence every time

SPECIFICATIONS

Model: BP-100

Type: sport-scale utility plane

Wingspan: 100 in.

Wing area: 1,950 sq. in.

Length: 49 in.

Weight: 18 to 25 lb.

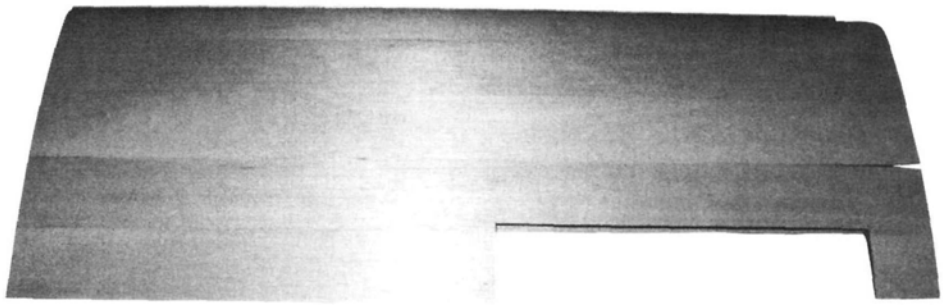
Wing loading: 23.6 oz./sq. ft. @ 20 lb.

Airfoil: flat-bottom

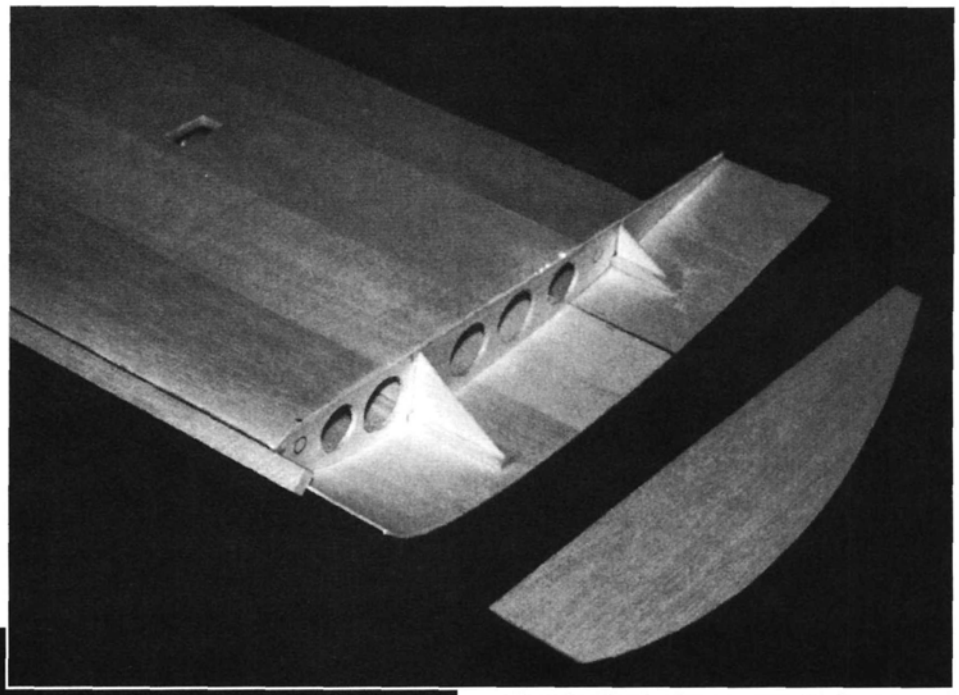
Radio: 4-channel (ailerons, rudder, throttle, elevator)

Engine: 1.80ci 2- or 4-stroke glow up to a 62cc gas

Comments: designed by Ron Daniels, this scale-like model is slow and agile enough to get into and out of the smallest flying fields, and it's nimble enough for most aerobatic maneuvers. Its 2-piece plug-in wing allows it to be transported easily. An engine cowl, wheel pants and composite main landing gear are available from Aeroglass. The author offers a short kit ($150 plus $7.50 S&H).

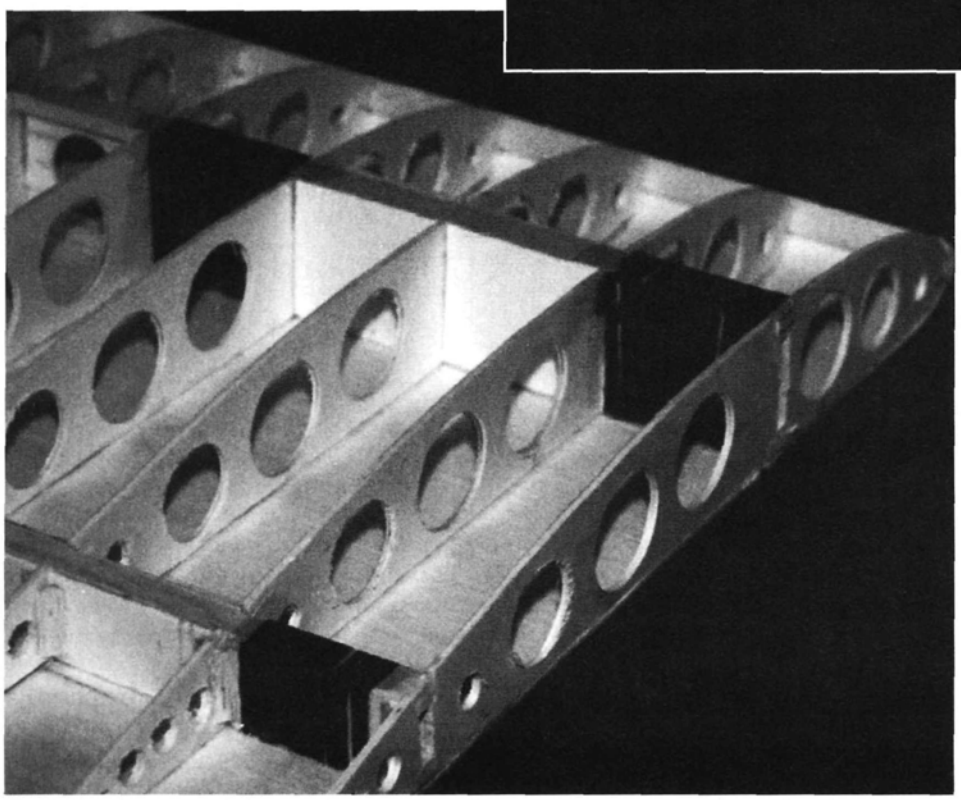


The prototype's wing was fully sheeted, but the plan shows an open-bay construction with LE and TE D-tube construction and rib capstrips.



The wingtip sheets are assembled over small triangular formers.

you bolt the wing into place. During construction, set the wing to the correct incidence while it's bolted into place but before you've epoxied the wing blades into place. When everything is right, glue the wing blades in permanently. It is very important that they be sanded and then sealed with resin so that they will not swell or bow with changes in humidity or moisture or be saturated with oil. The lift struts are made of ⅝-inch-wide, airfoil-shaped aluminum tubes available from Commander RC Models.

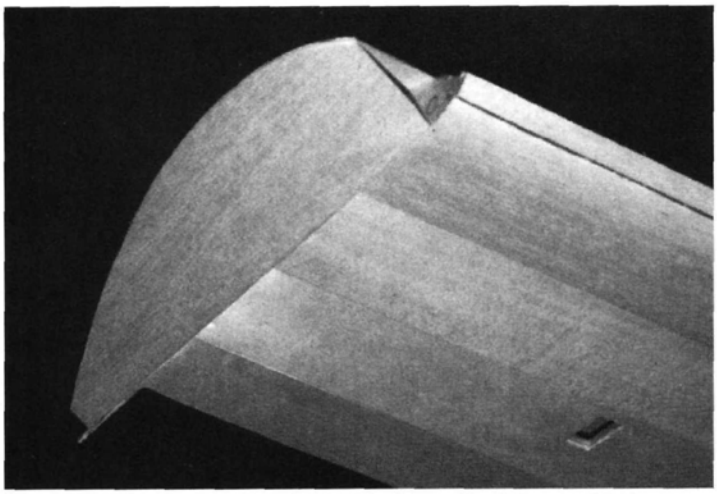


The wing panels are designed with web box sockets in their roots so they can be slid onto the blade wing joiners that are built into the wing. Note the carbon-fiber tow wrapped around the web boxes for strength.

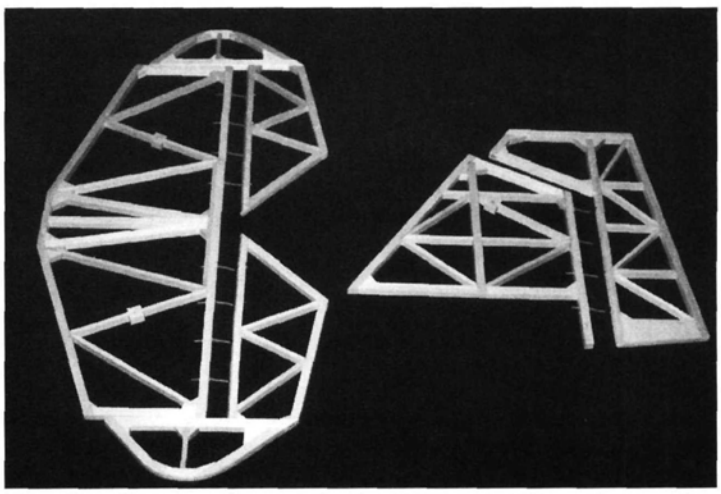
FINAL ASSEMBLY

The rest of the construction is pretty straightforward. I attached the tail surfaces to the fuselage using 15-minute epoxy. I decided to use Aeroglass composite main landing gear, but if you prefer, you can use some other commercially available gear or form your own using ¼-inch-thick 6061 T-6 aluminum. The wheel pants and engine are also from Aeroglass.

Except for the elevator, which uses one giant-scale servo, I used standard servos (one for each control surface). Each aileron also has its own servo. The throttle servo is installed in the front corner of the cabin area just aft of the 32-ounce fuel tank.



Here, the tip is in place but the LE block hasn't yet been added.



The tail surfaces are of a very simple stick construction and are made of balsa and spruce members.

In the prototype, I use a SuperTigre 4500 2-stroke glow engine turning a 22x6 or 22x8 prop. With a BCM Pitts-style muffler, this power system is a good match for the 22-pound model.

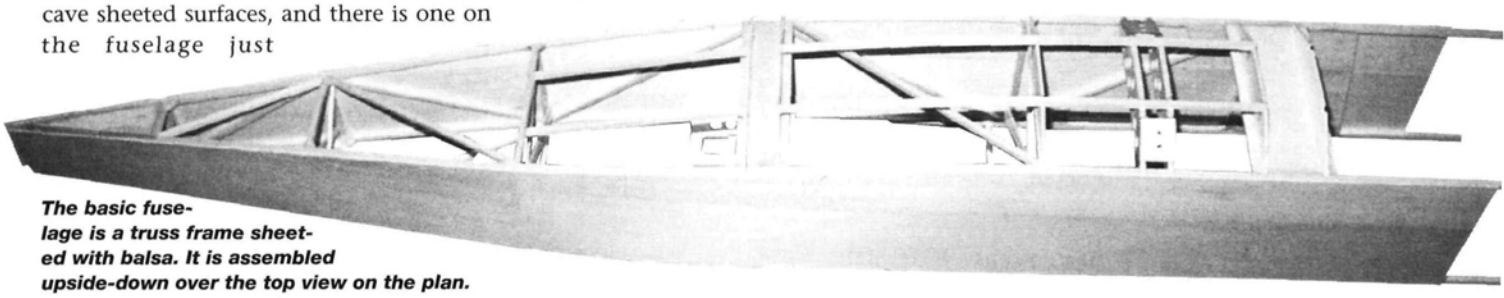
Finish your model with any material you feel comfortable with; I covered my fuselage and wings with 0.5-ounce glass cloth and paint, and the tail surfaces with silkspan, dope and paint. I recommend that you use an iron-on fabric for the wing and tail and 0.56 or 0.75-ounce glass cloth for the fuselage. I am lousy at getting heat-shrink coverings to stick to concave sheeted surfaces, and there is one on the fuselage just behind the cabin on the top turtle deck. Patterns for the windshield and side windows are included on the plan.

On an airplane this big, I like some receiver-power redundancy, and I use two, 600mAh, 5-cell flight packs in parallel. I also run separate battery leads directly to the receiver (I plug one into an unused channel). I use two standard on/off switches with diodes soldered onto the leads so that the current cannot flow from one battery pack to the other but can still flow from the charger to each of the packs.

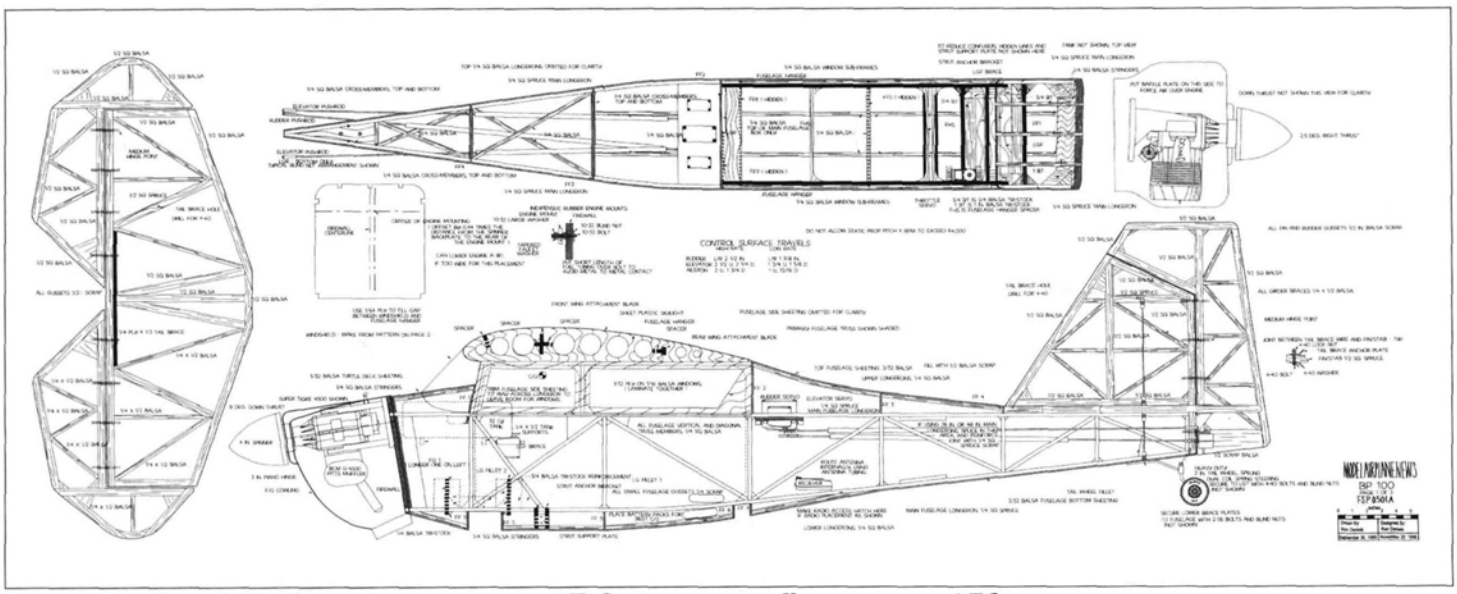
The diode also drops the voltage to prevent the jittering that can happen with some radio systems on a freshly charged 5-cell pack. This system is cheaper than a single-pack 1200mAh system with heavy-duty wiring and switch, and it offers much greater safety.

That's about it. If you want a good sport giant-scale plane to fly or you want something that looks like a scale model but isn't (just to fool your friends), the BP-100 might just be the one for you.

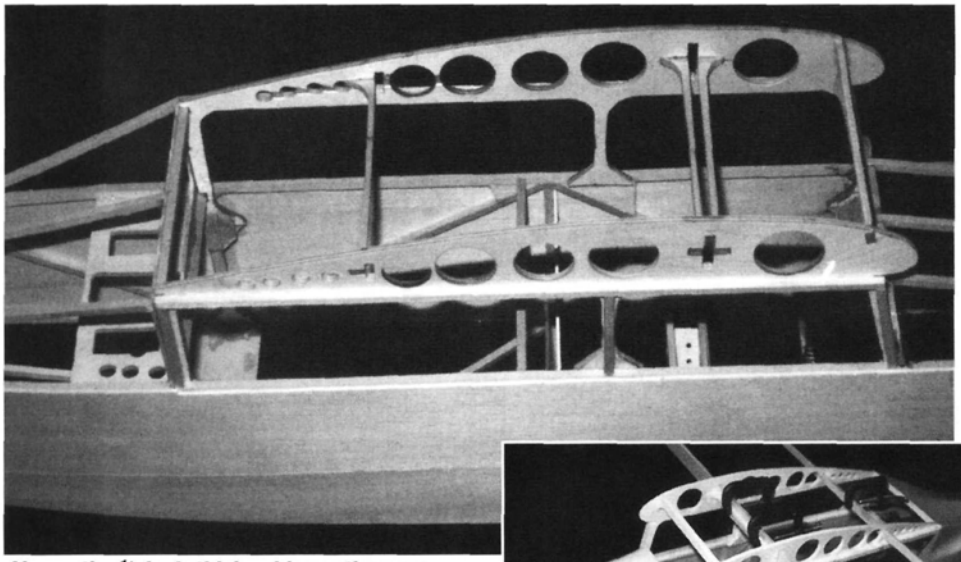
To help you save time, I offer a 110-



The basic fuselage is a truss frame sheeted with balsa. It is assembled upside-down over the top view on the plan.

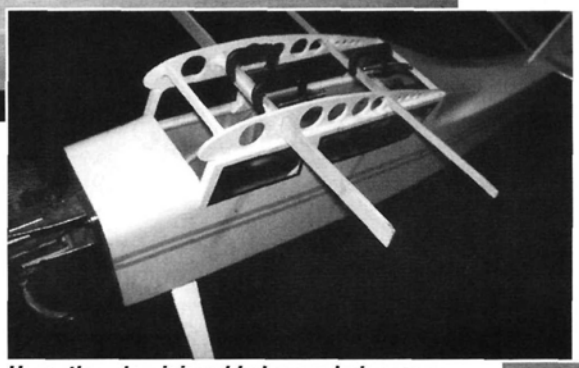


To order the full-size plan, turn to "RCstore.com" on page 152.



Above: the ¼-inch-thick cabin sections are added to the lower fuselage structure. Note the slots where the wing joiner blades will be inserted.

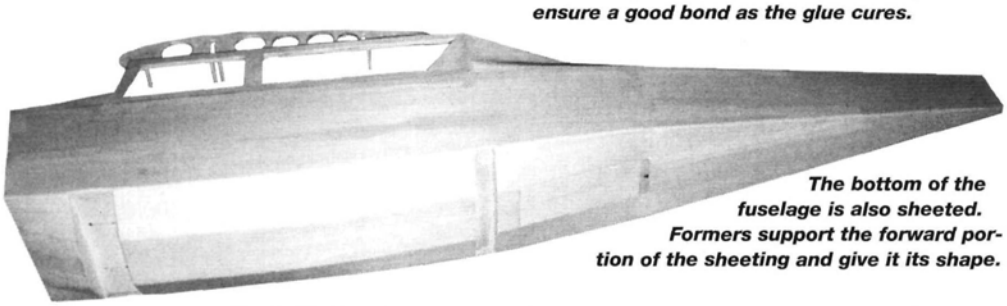
The tail surfaces are reinforced with rigging wires as shown here. The rib members to which the wires are attached are made of spruce for strength.



Here, the wing-joiner blades are being epoxied into place in the upper cabin structure. I held the pieces together with C-clamps to ensure a good bond as the glue cures.

piece BP-100 short kit. Write to me at 15 Tradewinds Place, Kitchener, Ontario, Canada N2N 3G4, or visit my website http://members.aol.com/rwdrc. ✈

***Commander R/C Models**, Langley #7-5333 216 St., Langley, BC V2Y 2N3 Canada; (604) 514-3027; fax (604) 514-3028; www.seacommander.com.*
***Aeroglass**, Box 185, Langton, Ontario, Canada NOE 1GO; (519) 875-1533; fax (519) 875-1855.*
***Great Planes Model Distributors Co.**, P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008; www.greatplanes.com.*
***SuperTigre**; distributed by Great Planes.*



The bottom of the fuselage is also sheeted. Formers support the forward portion of the sheeting and give it its shape.

FLIGHT PERFORMANCE

I flew the BP-100 for the first time on a relatively calm day. It takes only a few minutes to assemble it, but never fly it without having the main wing struts in place. After I had filled the tank, done a range check and test-run the engine for about 10 minutes, I refilled the tank and taxied it out. Ground handling is excellent—no tendency to flip or ground loop—and the rudder provides excellent steering control. I advanced the throttle, steered with the rudder and left all other controls at neutral. When the tail came up, I added a hint of up-elevator and the model took off. (With a more rearward CG, you may not need to add elevator to get liftoff.)

• TAKEOFF

The BP 100 has a very short takeoff and is airborne at a very low airspeed. All the controls are effective immediately, though the rudder can be very sensitive. Fly a few close-in circuits until you get used to the plane. Except for a subtle settling of the nose when you idle the engine down, there shouldn't be any trim difference between full throttle and high idle. With its high drag and ability to fly at very low speeds, it is a very relaxing airplane.

• LANDING

I like to bring it in on the mains with a little extra flying speed. This is easier than trying for a 3-point landing, as that can require great patience to slow the airplane enough to stall the wing and then keep the plane on the ground. A hint of down-elevator after touchdown will ensure that the tail doesn't drop until the plane has slowed to below flying speed. Deadstick landings are a breeze.

• GENERAL FLIGHT CHARACTERISTICS

With my ST 4500 using a 22x6 or a 22x8 prop, the model will climb nearly vertically. If you first build up some speed and then pull to vertical, it will stop by itself at about 100 feet up and hang on the propeller. It will happily fly at ¼ to ⅓ throttle, and it looks very true to scale doing it.

• AEROBATICS

The model will do all the looping, rolling and inside snapping maneuvers as well as very good spins, knife-edge (lots of aileron correction required) and flat turns. Cuban-8s require a little more speed before you do the half-roll on the down-leg. Stall turns are a no-brainer; you can even start to go in one direction and then change your mind and go in the other. Inverted flight requires hardly any down-elevator.

Affordable sport radio with 3-model memory

JR XF631

by Bob Aberle

The engineers at JR have come up with yet another new, easy-to-operate computer radio system: the XF631. This intermediate-level radio offers the same basic features as JR's entry-level XF421 (reviewed in the June 2000 issue) yet also has an extra channel function (six in total), three model-memory positions, digital trims, throttle cutoff and dual rates on elevator and ailerons.

ABOUT THE SYSTEM

The JR XF631 system includes a 6-channel transmitter and receiver, four ball-bearing NES-537 servos, a dual-output battery charger, an airborne Sanyo Ni-Cd battery pack, a switch harness, aileron extension cable, extra servo output arms and mounting hardware, frequency flag set and the usual excellent, easy-to-follow instruction manual. The system is offered on 72, 50 and 53MHz RC channels. Operation is FM (PPM) with deviation on the high side, so it's compatible with Airtronics equipment. The transmitter doesn't have a removable radio-frequency module, but the crystal is accessible from the rear of the case. As is common with many of the JR computer transmitters, a lithium battery maintains the computer memory when the battery power is turned off. This battery has an expected life of five years, after which you must return the transmitter to the factory for battery replacement. The JR service department will check overall operation and tuning at the same time.

The XF631 comes with four NES-537 ball-bearing servos, a 4-cell Sanyo 600mAh Ni-Cd battery pack, switch harness and 7-channel R700 Slimline receiver.

ABOUT THE TRANSMITTER

Control-stick lengths on the transmitter can be adjusted, as can the spring tension, if you remove the rear case cover. Because they're more precise and easier to store in the computer memory, digital trims are becoming more popular in modern computer radios such as the XF631. Because you input the trim using a push-button instead of a lever, it can be difficult to determine the amount of trim employed. To help with this, apply trim in one direction, observe the momentary digital readout on the LCD screen, then restore the trim back to its original position.

JR was also kind enough to includ throttle-cutoff on the XF631. After landin your model, you can cut off the engir (completely close the carburetor) by pres ing this button. Without this feature, yc would have to pulse the throttle digital-tri button many times to kill your engine, ar then you'd have to remember to return it its original position.

The usual JR transmitter features are al included in the XF631, including an audib and visible low-battery warning when t transmitter power drops below 9 volts; optional DSC cable to allow you to opera your model controls without creating on-air signal; and provision for an optior trainer cable that will work with most oth JR transmitters.

A fifth channel (retract) switch is at t top left corner of the case. This non-prop tional channel has endpoint adjustme but no trim feature. The elevator dual-r switch is just below this switch and can e ily be reversed, i.e., dual rate can be "on'

All of the function switches are easily accessible, and the easy-to-read LCD screen displays model memory, basic function information and battery voltage.

the upper and lower positions. The trainer-enable button is just to the right of this switch.

On the top corner of the right side, a sixth channel function switch is identified for flaps but could be used for any auxiliary function. It is also a non-proportional channel with endpoint adjustment but no trim available. The aileron dual-rate switch is just below this switch, and to its left is the throttle-cutoff button.

A 1½x1-inch LCD screen in the center of the transmitter case displays all of the stored computer data. When the transmitter is first turned on, the model memory position or three-character model name of your choice will appear. In addition, the transmitter operating voltage is shown digitally.

Computer inputs, or commands, are easily made using two momentary contact slide switches below the main power switch. The left switch is identified as "Scroll/Channel" while the right switch says "Increase/ Decrease." Push both of these switches up for an "Enter" command.

The XF631 uses two menus: "Systems Setup" and "Function Mode." To access the systems-setup menu, press both computer slide switches upward while turning the main power switch "on"; to access the function mode, push both switches up with the power already "on." The proximity of these two switches on the XF631 makes this task easier than it was on the XF421 system.

Systems setup includes model-memory selection, naming the model, reset (to return to factory settings) and a choice of mixing circuits (flaperons, delta and V-tail). The function menu includes servo-reversing, endpoint adjustment (on all six channels), dual rates and subtrim. Subtrim allows you to store the actual digital trim position in memory and then place the trim button back at zero. This is a really worthwhile feature when you use one transmitter to operate three different airborne packs in different planes. All computer settings are saved automatically when you go to the next menu item or turn the power off.

AIRBORNE EQUIPMENT

The XF631 comes with the new JR R700 7-channel receiver, which is even smaller and lighter than the excellent-performing JR R600. This new receiver measures 2x1x$^{9}/_{16}$ inches, weighs 0.65 ounce and has a 39-inch-long antenna. The connector block is on the end of the receiver case, so it's even easier to install in narrow fuselages. JR proprietary connectors have the positive pin in the center and are compatible with most other brands of connectors. This receiver conforms to all FCC and AMA guidelines, and independent testing has proved it to be even better than the R600!

The XF631 also comes with four new JR NES-537 servos—JR's new standard ball-bearing servo. Each servo measures 1½x1½x¾ inches and weighs 1.38 ounces. Output is rated at 43 oz.-in., and the transit time for 60-degree rotation is claimed to be 0.25 second. Each has a ball-bearing-supported output shaft with wide spacing for improved accuracy.

A 3.2-ounce, 600mAh, 4-cell battery pack in a heat-shrink wrap rounds off the airborne equipment. Total airborne weight, including the receiver, four servos, switch harness, battery pack and aileron extension cable, is 10.1 ounces.

JR's new R700 7-channel Slimline receiver weighs 0.65 ounce. The connector pins are at its end, so it easily fits into narrow fuselages. It performs even better than the JR R600, and that's saying a lot!

SPECIFICATIONS

Model: JR XF631

Type: 6-channel computer radio w/3-model memory

Distributor: Horizon Hobby Inc.

Transmitter: 6-channel dual stick (Mode II); 1 lb., 12 oz.

Receiver: JR R700 (0.65 oz.; 2x1x$^{9}/_{16}$ inches); has seven channel functions. JR proprietary connectors plug into the end of the case. Antenna is 39 inches long.

Servos: JR NES-537 with ball-bearing-supported output shaft; 1.38 oz. each; 43 oz.-in. output; 0.25 second transit time for 60 degree rotation; 11-inch cable.

Accessories: switch harness with bulkhead mount; 4-cell, 600mAh Sanyo Ni-Cd battery pack with heat-shrink case; dual-output battery charger; aileron extension cable; servo-mounting hardware and extra output arms; frequency flag set and instruction manual.

Weight of airborne pack: 10.1 oz. (receiver, four servos, switch harness, battery and aileron extension cable).

Street price: $219.95

Features: 6-channel control, 3-model memory, available on 72, 50 and 53MHz RC channels; modulation is FM (PPM) with high-side deviation that's compatible with Airtronics equipment.

Comments: this radio is a step up from JR's entry-level XF421EX; it has more features but is still very easy for beginners to learn with.

HITS

- Easy to learn and operate.
- Three model memories.
- Dual rates and digital trims.
- New lightweight and compact receiver included.
- Excellent instruction manual.

MISSES

- None found.

SUMMARY

The JR XF631 is a great step up from JR's entry-level XF421. The XF631 is easy to learn and operate and, at a street price of around $220, it's very affordable. The excellent instruction manual takes you through every step and, with its three memory positions, you can easily use the XF631 to operate three different models.

Airtronics, 1185 Stanford Ct., Anaheim, CA 92805; (714) 978-1895; fax (714) 978-1540; www.airtronics.net.
Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.
JR, 4105 Fieldstone Rd., Champaign, IL 61822; (217) 355-9511; www.horizonhobby.com.
Sanyo, 2055 Sanyo Ave., San Diego, CA 92173; (619) 661-6620; fax (619) 661-6743.

 by Gerry Yarrish

Test-flying your big bird

Sooner or later, you will reach the point at which you want to test-fly a new model yourself and not leave it to a more experienced builder. Let's look at some of the many things you need to check and consider to ensure a successful first test flight of any model, and especially your first giant-scale plane.

Even your big bird will have to be test-flown; don't do it at a flying event. Instead, take it to a quiet local flying field with a friend to help out. Take it one step at a time.

FORMULA FOR SUCCESS

By all means, ask an experienced friend to help you check a new model to see whether anything is missing or whether the setup is incorrect. A second pair of eyes is always good. Remember: a successful first flight doesn't start at the flying field, it starts on your building board. I give you my word that if you build a sound, straight model, your chance of having a good first flight will be 100 percent better. Here's a preflight checklist of questions; I call it my "10 top reasons not to fly!" If you can't answer "yes" to all 10, you should not fly—at least, for the time being.

1. Are all your controls installed properly with hinges that don't bind and have only a minimal hinge gap? Big airplanes have larger engines, props and control surfaces than you may be used to. Flutter can be a real problem if you don't use strong, smoothly operating hinges. Pull on the control surfaces and make sure they are all tightly secured. Use more hinges; if you usually use three hinges for a given control surface, use five in your bigger models.

Make sure your engine is properly installed and broken in. Test-run the engine and run a few tanks of fuel through it to make sure fuel flow is adequate, even with the model pointed straight up.

At home, before you head for the flying field, check the control linkages and all the clevises to make sure all is as it should be. Flying fields are for flying, not for doing maintenance. If you have pull/pull cable control, make sure each cable is properly tightened and clear of any internal snags.

2. Are your servos and pushrods properly installed? Tight control surfaces aren't of much use if you have excessive slop in your control system. I like to install my servos in plywood plates that are secured with screws to strong hardwood rails. I also add doubler strips under the servo screws to give them more material for the screws to bite into. You can use several kinds of pushrods, depending on the type of airplane you fly. You can still use dowels and wire pushrod ends, but make them with larger-diameter dowels and support them with balsa guides at their midpoints to prevent them from bowing under load. Flexible pushrods that have outer sleeves should also be braced every 6 to 8 inches with scrap balsa so that they cannot flex. For heavier models, use heavy-duty flexible pushrods.

3. Are your servos, pushrods and control horns the proper size for your model? Servo torque (output strength) must be up to the task at hand (see Figure 1). To minimize bowing and flexing, the pushrod wires must be large enough to handle the

FIGURE 1. SERVO GUIDE

Matching your servos to the size of your model is necessary for both safety and expense. You don't want to skimp on control authority, but to save money, simply buy the strongest servo that will control your plane adequately; there's no need to spend more. Here's a list of servo and function data I use for my low-wing, high-performance models.

Airplane size (span)	Control function	Servo output torque (oz.-in.)
72 in.	Aileron	75
	Twin aileron setup	45 each
	Rudder	75
	Elevator	75
	Twin elevator	45
80 in.	Aileron	90
	Twin aileron setup	60 each
	Rudder	90
	Elevator	100
	Twin elevator	60
90 to 100 in.	Aileron	120
	Twin aileron setup	75 each
	Rudder	100
	Elevator	120
	Twin elevator	75

Always have a friend securely hold your big bird when you start it. Here, my flying buddy Rick Bell secures my Giantscaleplanes .com Staudacher on its very first time out. Safety first.

expected flight loads, and the control horns must be strong enough to transfer the control system's power to the control surface. Always use 4-40 pushrod wires and clevises and some sort of keeper on the clevis. This can be a spring retainer, a retainer clip, a small O-ring, or a thin slice of fuel tubing pushed over the clevis to prevent it from accidentally springing open. I prefer to use Robart swivel control horns and clevises, as they're joined by a small screw and locknut.

4. Is your battery pack big enough, and is it properly charged? With bigger control surfaces and stronger servos on board, you need batteries with a higher capacity; start thinking four digits for battery size. My minimum even for moderately sized models is 1200mAh. If you use many servos in your model (one for each control surface), or if your model will experience high flight loads (doing a lot of aerobatics), use even higher capacity batteries; 1400, 1500, 1800, and even 2000mAh packs are readily available. For moderate flight loads and current drains, the new nickel-metal-hydride (NiMH) cells offer a higher capacity without a large size and weight increase. It is also a good idea to switch to a larger, heavy-duty on/off switch when using larger battery packs.

5. Does your engine run properly? To fly safely, your engine must run reliably and idle low enough to allow you to land easily. Throttle response should be smooth, and the carb must be adjusted properly. For a 2-stroke gas engine with a high needle and a low needle, a slight burble in the midrange is acceptable. Your prop should also be the correct size for the engine, and it should definitely be balanced to minimize vibration. The engine should be mounted securely, and with gasoline engines, use a "kill" switch for safety. It's very convenient to have a second kill switch installed so you can stop the engine with your radio. This can save the day if you find that the idle is too high for a safe landing. If your engine has an electronic ignition system, make sure its battery pack is fully charged and operating properly. How about the glow plug or spark plug? Is it new? It should be.

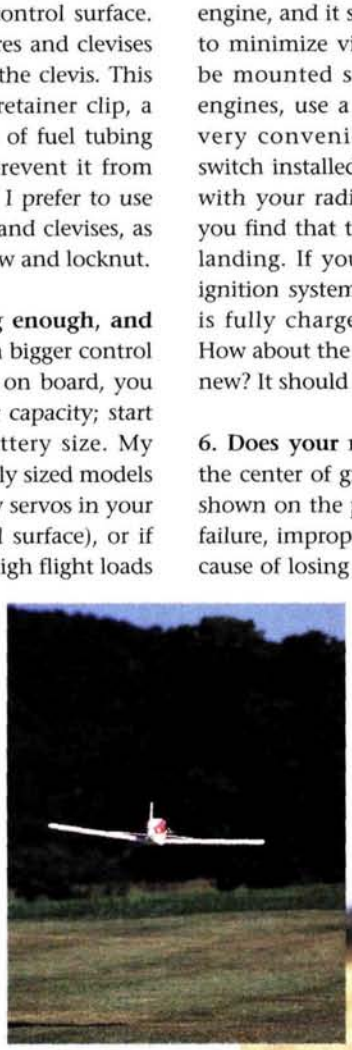
6. Does your model balance properly? Is the center of gravity (CG) within the range shown on the plan? Second only to battery failure, improper CG location is a common cause of losing a model. While building the model, try to place as much weight forward of the CG as you can. If in doubt, screw some lead weight to the firewall and err in favor of nose heaviness. A nose-heavy condition may not be good, but it is a lo better than being tail heavy. You should also check to make sure that one wingtip is not a lot heavier than the other. This will help to minimize the need for aileron trim changes.

7. For gasoline engines: is your fue fresh and properly mixed with 2-stroke oil? If this is the first flight of the flying season, don't use the fuel that been sitting in the container all winter. Dispose of i properly, and buy new gasoline. Be sure to use a filter when you fill the container and use a filter when you fill your model's tank; it doesn't take much debris to clog your fuel line. Also, use gasoline-safe fuel line and tank hardware.

8. Did you range-check your radio? This very basic rule is often overlooked in the excitement of a first flight. Make sure you plane can still be controlled at least 75 fee away with the transmitter antenna col lapsed. If you get servo jitter, try to relocate the receiver antenna wire; I usually install i externally to keep it away from long servo leads in the model's tail. Also check the radio range while the engine is running.

9. What is the wind condition for the test-flight day? Wait for calm weather fo your first flight. You'll be nervous enough without having to worry about wind gust and crosswinds. Make it easy on yoursel and wait for the most forgiving conditions.

10. Last, do all controls work properl and in the correct directions? If you us a computer radio, make sure you are o the correct model-memory number fo



On that first takeoff and climb-out, keep the departure angle shallow, and build up airspeed before you increase the climb angle. Also, make sure you have plenty of safe space ahead of the airplane in case the engine dies; that's good advice for every takeoff.

On landing, keep the airspeed up a little and control the descent angle with the throttle. Then adjust airspeed with small inputs of pitch adjustment. Don't stop flying the model until it comes to a complete stop.

your model. Often, control reversal can happen just because you selected the wrong model settings.

If you can't answer any one of these questions satisfactorily, please consider not flying. Go back to your workshop and fix anything that is questionable. If you build your model properly from the beginning and test-run your engine at home, most of the time, this checklist will serve only to reinforce your confidence in your model and in your craftsmanship—confidence that goes a long way toward making the hobby both safe and fun. Now, let's do it.

Save this kind of flying until you've successfully made a few test hops. When you're low and inverted, it isn't the time for guesswork.

THE FIRST FLIGHT

Before takeoff, set up your model's control throws properly. If you have dual rates, set up your high- and low-rate values to the throws recommended in your model's instruction manual. Set high rates first, and then set the low rates to about 60 percent of the high settings. If you have exponential (expo), dial in about 30 or 40 percent for the first flight. You can always adjust the sensitivity later, but you really don't want to over-control the model on its first time out.

Fuel up your model, ask your buddy to hold it, and start the engine. Let the engine warm up a little, and check the throttle response and idle. Taxi out to the end of the runway and slowly advance the throttle. Do a few taxi tests, slowly increasing speed with each run time until you feel confident that you can control the model's heading with rudder. If everything feels OK, taxi back to the end of the runway, turn into the wind and advance the throttle again. Let the model accelerate into the wind, and when it gets light on the gear, apply a little up-elevator and let it break ground. After liftoff, keep the departure angle shallow, and let the model gain airspeed before you add a little more up-elevator to climb out. Remember to ease off the elevator and even apply some forward stick (down-elevator) if the climb-out angle gets too steep. Remember to maintain airspeed.

Make your first few turns shallow, and use rudder to coordinate them. Once your model is at a safe altitude, throttle back to about 75 percent power and trim the model for straight and level. Note how it "feels." Is it sensitive to control input or could it use more control throw? Take mental notes, or better yet, ask your buddy to write down your comments. If all is as it should be, take a deep breath, fly around the pattern a few times, and try to calm down. Don't do anything fancy right now; you can loop and roll during the second and third flights, but for now, just feel the model out.

Once you feel comfortable, fly the model at a slower airspeed, and adjust the elevator trim for the reduced throttle setting. See how it behaves and how the controls feel at the lower end of the speed envelope. Once you feel confident with the model's slow-speed handling, try a low pass or two to dial in the "proper-size picture" in your head. If this is your first really big model, you will tend to fly it too far away from yourself. If your big model looks the same to you as your .60-size model does on landing, then your model is too far out. Before you set up your first approach and landing, you should get comfortable with the bigger presentation of your giant model. Your model should look big to you on a good approach. Remember to bring your throttle trim down to the landing position.

Approach at a moderate descent angle and remember to maintain a little throttle to control the descent rate (about ¼ throttle). When your model is over the end of the runway, treat it just like a smaller model. Pull the throttle to idle, keep the wings level, and use rudder to correct heading. Fly the model all the way down, and then flare just before you touch down. Because it's a bigger, more efficient aircraft, your model may float a little after the flare because of ground effect. Be aware of this, and make sure you won't run out of runway. Let the model run out straight, and stay on the rudder until it comes to a stop. Now breathe again, and taxi back to the pits.

Wow! That wasn't so hard. Nothing is really as rewarding as the first time you test-fly your own model. Take everything one step at a time, do your homework, and all your test flights will be the same—uneventful!

Giantscaleplanes.com, 201 S. 3rd St. & Rt. 309 N., Coopersburg, PA 18036; (610) 282-4811; fax (610) 282-4816.
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The entries in a Californian Goodyear "trial race"—the predecessor of the AMA Goodyear event.

HISTORY OF

by Hal deBolt

Most RC events are interesting to watch, and participants surely enjoy them, but the most exciting for fliers and spectators is undoubtedly pylon racing. When four planes speed around a pylon course, everyone involved is guaranteed a raised adrenaline level. If you haven't seen it, it might be hard to appreciate just how exciting this fast-paced event can be.

How did this RC sport develop? Well, I was in on it at the beginning, so I'll tell you what I remember.

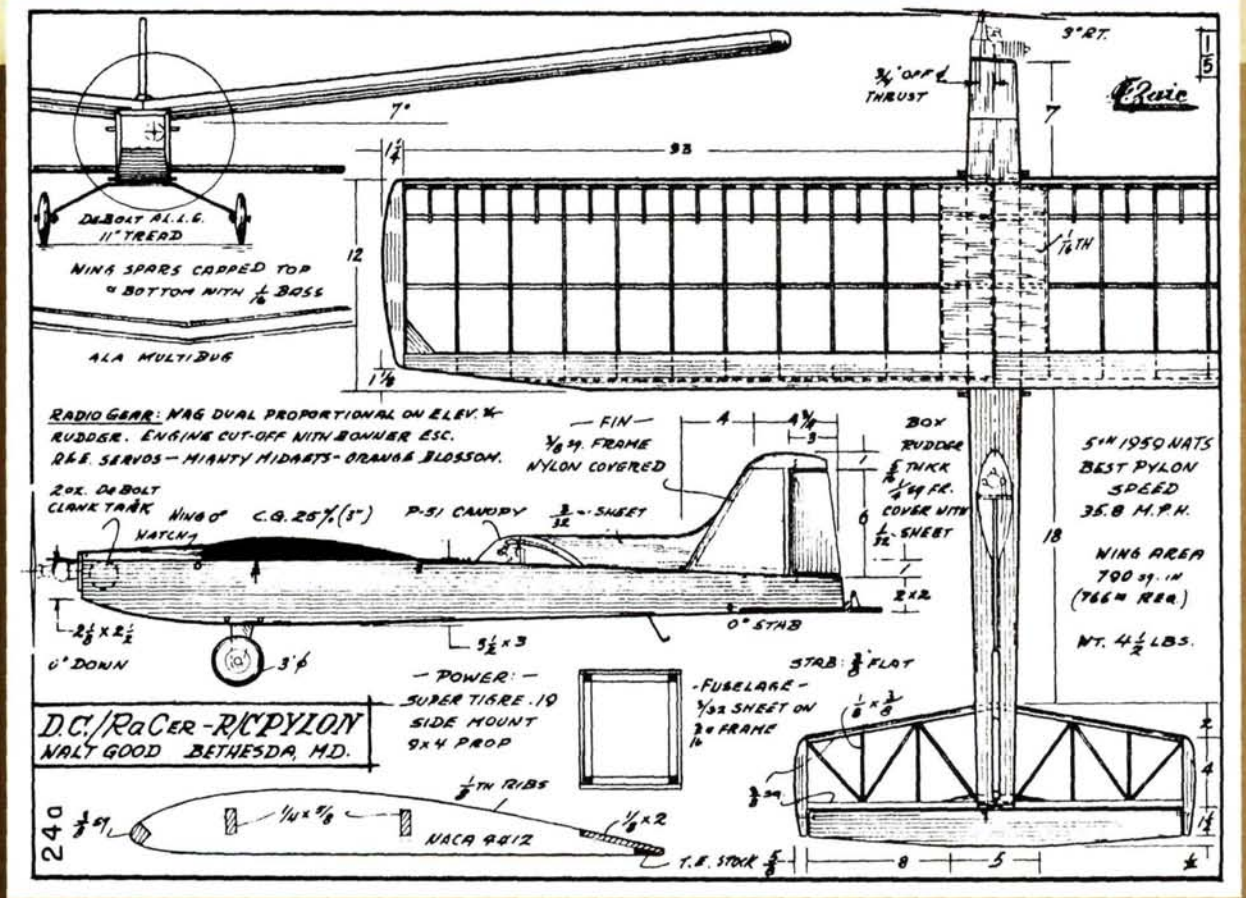
THE BEGINNING

Like most things, RC competition began in a small way. In 1956, the AMA held its first competitive event, and Chet Lanzo took top honors with a 2½-minute program that included two controlled turns. It took 15 more years for a contest maneuver schedule to emerge, and at about the same time, our urge to race with RC became obvious.

Early AMA pylon "races" involved only one plane flying against the clock around two pylons for four, ¼-mile laps. Because radios weren't very reliable, few of us were confident enough to risk the required low, precise flight!

Two of the NMPRA organizers: Gil Horstman (left) and Ed Shipe. They and their associates established a viable nationwide NMPRA.

With the arrival of citizens band (CB), the RC hobby was accessible to a multitude of modelers, and increased demand for RC equipment soon led to developments that made it more reliable. RC contests featuring rudimentary maneuvers became commonplace. There was still one hurdle to be overcome: only one contestant could fly at a time, so during a day there wasn't time for any pilot to fly more than once or twice. To ameliorate the situation, contest organizers scheduled two simultaneous events. With the addition of pylon racing, entrants could fly several times—usually



For the AMA pylon event, the DC/R group developed a club racer. This is Walt Good's version; other similarly specialized racers evolved.

GO FAST, TURN LEFT!

RC PYLON RACING

A typical Formula II FAI racer: Caudron style; HP .40 engine; 600-square-inch wing; retractable landing gear.

more in pylon than in stunt. This was still "AMA pylon"; most flew their sport planes, or even their stunt-pattern craft.

Interest in pylon contests led to the development of special pylon racers, and rules soon called for two sizes with specified wing areas:

- for up to .15 engines and 350-square-inch wing area;
- for .19 engines (the more popular) with 600-square-inch wing area.

In those early AMA pylon days, the goal was to complete the course in 3 minutes, racing only against the clock; today, 1 minute is the goal for the 2½-mile pylon course.

The first license-free CB spot was 27.255MHz, but the popularity of RC flying impressed the Federal Communications Commission so much that it opened five frequencies on the 27MHz band. Having five frequencies allowed planes to race alongside one another, and these early, rudimentary, unofficial races showed potential.

RC racing was modeled after full-scale events: the early Bendix Air Races inspired the Cleveland Air Races and the Reno Races, and the full-size "pylon polishing" racers attracted huge crowds to these events. We enjoyed the Cleveland Races for decades, but then dramatic and tragic crashes—caused, in part, by skyrocketing speeds—led to a concern for public safety and, ultimately, the end of the event—a disaster for the speed merchants who wanted to know how they could continue to race; in fact, there was so much

At a New England championship race, Dave Gierke assists Hal deBolt with his "prototype class" Goodyear racer.

This Midget Mustang typifies the late-'70s Formula I racers; K&B .40 Schnuerle-ported engine; 8¼x8 prop; 50-percent-nitro fuel; 25,000rpm!

Typical ¼ Midget racer patterned after the Firecracker Thompson Trophy racer; 300 square inches; Cox .15 Conquest engine.

Sponsored by Maurice Woods in Oklahoma City, the inaugural Tournament of Champions featured one of the first nationwide Goodyear events

interest that a group formed a committee with the idea that racing could be both exciting and safe. Its members proposed a new class of racing with new restrictions; for example, only stock Continental B5 engines would be allowed, and aircraft size would be limited. But ideas are nothing without sponsors, and that's where Goodyear stepped in.

From there, it's history. The Goodyear Air Races caught on and, when no longer sponsored by Goodyear, became the "Formula One" races.

FULL-SCALE INSPIRATION

The inspiration for our hobby obviously came from the full-scale aircraft we all marveled at, and the same is true of RC racing events. Much of the credit for RC racing goes to prolific visionary and Californian Jerry Nelson. After attending the Goodyear Races, he returned to the West Coast feeling that an RC counterpart was not only possible but was also just what RC fliers needed.

Jerry quickly designed several "scale" racers around the K&B .40 engine, and he and others built a few. Among them were the Midget Mustang, the Whittman Buster and the Little Gem. They performed as he had hoped and enticed enough West Coast modelers to give racing a try.

After giving the matter much thought, Jerry and his group developed the concept and came up with appropriate regulations, but before they could present it to the AMA for consideration, they knew they had to prove its viability—especially something as revolutionary as their pylon event.

In 1965, they approached their first season's races tentatively, but the enthusiasm that the events generated soon convinced them that they were on the right track. Racers felt that competing against one another instead of just the clock was more exciting for them and for spectators; they felt the event would replace AMA pylon and be of interest nationwide.

Ed Shipe and others took on the chore of organizing the National Miniature Pylon Racing Association (NMPRA) and, through the AMA, a call for members went out. The response was gratifying, and the NMPRA was soon a sizable organization.

Their primary need was to present the AMA with sound, practical "Good-year Event" rules that would suit most AMA pilots. The initial rules were felt to be West Coast-oriented, and organizers weren't sure they would be universally accepted. I was one of the rules committee that was established with representatives from all over the U.S. to review the "trial rules"; our major concern was to accommodate the wishes of the AMA majority. I immediately realized some shortcomings: the rules required a close-to-scale, 450-square-inch wing area rendition of an existing Goodyear racer. It seemed to me that a Goodyear fuselage scaled to that size would be grotesque and wasn't required to meet our objective. The committee altered the rule to read: "Model must closely resemble, in appearance, an existing Goodyear racer." We also established minimum sizes that brought the fuselage down to a respectable size.

Dave Kelly of the Canadian United Pylon Racing Circuit displays his colorful Formula I racer.

Cliff Weirick, former AMA president, on a Nats starting line with his Midget Mustang Goodyear racer.

The "scale rule" at the time limited the number of allowable styles we could use. It was the late 1950s, and the choice of full-scale craft was relatively small. Of course, we wanted our RC models to look realistic when airborne, so the committee added the "Prototype" classification that meant original designs closely resembling Goodyear racers. Later, when we had a wider choice of full-scale designs to model, this category was dropped.

We also considered that a .40-powered 450-square-inch model was a "hot" craft, especially if flown off a grass field; for that reason, we held our first races at paved runways. Another consideration was that the vast majority of RC'ers had no experience with such small "hot" craft, and we feared that this might well hinder the event's general acceptance. Most RC'ers flying off grass found that .40-powered, 600-square-inch models suited them just fine.

We suggested a change to a 600-square-inch wing, but the trial racers had learned to like the 450 size and wanted to keep it.

The committee's solution was to establish two classes:

—Goodyear: 450 square inches;

—Continental: 600 square inches; could be patterned after any craft that had raced.

Having two classes actually broadened the appeal of pylon racing.

Two other rules also initially led to consternation:

• The models would be judged on appearance. Judges would score outline, overall appearance, etc., and the pilot with the highest static score would be the first to take off. This rule continues today, and by emphasizing appearance as well as speed, it ensures that all entries are of a high quality.

• The rule requiring a stock .40 engine produced in sufficient numbers to satisfy racers' demands was questioned—especially the term "stock." Engines were not as sophisticated as they are today; a knowledgeable "engine man" could easily modify an engine to increase its power without his modification being detected. Because of time constraints, the contest directors didn't inspect every engine: they depended on "honor" and inspected only the engines of the top three.

Having shaken out the kinks in the rules, the NMPRA proposed the Goodyear and Continental classes to the AMA

which accepted both; pylon was off to the races!

FULL-SCALE

When Goodyear discontinued its sponsorship, the Goodyear pylon category became "Formula One," and without a sponsor, full-scale pylon racing was again in the doldrums, but RC pylon was thriving and steadily gaining popularity.

The United Pylon Racing Circuit Championship trophy and a typical race trophy. Left: a Formula I racer; right: sport pylon racer.

When the full-scalers found individual sponsors, races were scheduled and new planes began to appear; they were faster, and their RC counterparts were, too—great for the event's appeal. With the full-scale event's name change, the NMPRA changed the RC events to Formula I and Formula II.

- Formula I: models had 450 square inches of wing area and a maximum weight of 4½ pounds (5 pounds today).
- Formula II: models had 600 square inches of wing area and a maximum weight of 4½ pounds.

Formula II was intended to be an entry-level event, and it flourished for a few years, but as RC'ers learned Formula Is were really solid flyers and could be operated off grass fields, they switched.

In approximately 1971, Glen Stickler of California conceived the "Quickie 500" pylon racing, and it soon gained a popularity that it still retains. Glen thought that fliers really wanted to race and that they were less concerned with the type of craft they flew.

The original Quickie 500 parameters were simple:

—500-square-inch wing area;
—a 15-percent-thick airfoil;
—box-type fuselage;
—Series 8011 K&B stock .40 engine;
—fuel provided by the contest organizer.

Quickie 500 soon spread from California and caught on nationwide; all scheduled races included a Quickie 500 event, and Glen's idea brought thousands into pylon racing!

The NMPRA also added the "¼ Midget"—another innovation intended as an entry-level event, but the cheaper models would make it more affordable. It called for models that were smaller than Formula Is, patterned after any racer and powered by a .15 engine. The 2-mile course was also shorter. Unfortunately, dyed-in-the-wool racers soon turned the event into one that was just as sophisticated as Formula I; "entry level" went out the window!

Since its inception, NMPRA has guided pylon racing. Many unselfish volunteers such as Ed Shipe, Gil Horstman and numerous others did an excellent job of handling the rapid changes, and the organization is still thriving.

FORMULA .40

This recent, less costly, form of competition seems to be a godsend because Formula I is now exceedingly expensive: engine costs approach $500, and fuel costs almost $50 per gallon—plus the cost of those "gold-plated" glow plugs! Newcomers are bound to think twice about incurring such expenses.

Elapsed-time goals continue to shrink. During the first Goodyear Races, the course goal was 3 minutes; by the time Formula I arrived, it was 2 minutes. Today, models fly at more than 150 mph, and the 2½-mile course time hovers around 1 minute!

One aspect of racing is being able to enjoy frequent events (such as those in NASCAR auto racing, for example). Fortunately, this need was recognized, and pylon-racing circuits were organized—five or more. I recall Michigan, Western New York, Canada and New England as being especially active. The great happenings racing on those circuits would fill a book—wonderful, exciting times!

FAI did not originally have a pylon category, but it existed in the U.S. before it caught on elsewhere. Britain had the unofficial "Club 20," but it was far less popular. In the U.S., we enjoyed two racing championships—the NMPRA finals and the AMA Nats. Most other RC events had a world championship fairly early on, and when the NMPRA decided it was time that pylon "went world" in 1969, it took considerable effort and FAI participation.

The FAI has a worldwide competition committee to establish rules and classes, and U.S. fliers asked for approval of a Formula I event.

Committee members felt the first task should be to introduce the event in other countries. We each received a "package" detailing our Formula I event, but the FAI rejected our proposal for these reasons:

1. Many fliers elsewhere had only rudimentary grass plots as flying fields, so the FAI thought Formula I models wouldn't suit their conditions.
2. Noise was a major issue overseas; all model engines abroad had to have mufflers, while Formula I craft did not.

Fliers elsewhere either could not obtain nitromethane or found its cost prohibitive.

Apart from these factors, Formula I was considered acceptable, but the problem of suitable flying sites appeared to be insurmountable. Our Formula II racers could be flown from any flying field, and we could easily use mufflers and run our engines without nitro.

The simple change to Formula II size earned the FAI's approval for an international pylon event, and we now have our world championship!

The first was held in 1972 in England and was won by Americans Telford and Violett!

Americans Telford (foreground) and Violett won the first FAI World Championship and some subsequent races. Here, they proudly display the first British trophy.

FAI pylon is notable for several outstanding championships, such as the 1974 Aero Olympics held in Lakehurst, NJ. In Australia, the event soon became really popular, and advances had Australians dominating the races.

Americans, meanwhile, were busy with Formula I and had little time and/or interest in FAI aircraft. Without the participation of U.S. fliers (among other factors), FAI racing dwindled, and they asked the AMA for advice on reviving the event.

John Worth asked me to join the five-man FAI racing committee, and my first move was to contact the members abroad. Of the five committee members, only three of our countries—Australia, Britain and the USA—had any pylon activity, and the event was really in the doldrums everywhere except Australia. They wondered why, if America was a hotbed of racing, there was so little interest in FAI pylon?

I then feared the end. Could there be a solution? Encouraging American participation was our only hope. The special FAI pylon model size requirement was one thing causing reluctance in the U.S. We had tried it before; would the rest of the world accept our Formula I models? It seemed to be our only chance.

As chairman, I again proposed the Formula I event; the Australian member was vehemently against it because fliers there enjoyed the event they had! To shorten a long story, I knew that somehow, I had to "sell" Formula I. It took volumes of correspondence and three years of effort to establish the current FAI event, and we had to rule out nitro and add mufflers. FAI pylon was reborn, allowing the ongoing and outstanding World Pylon Championships!

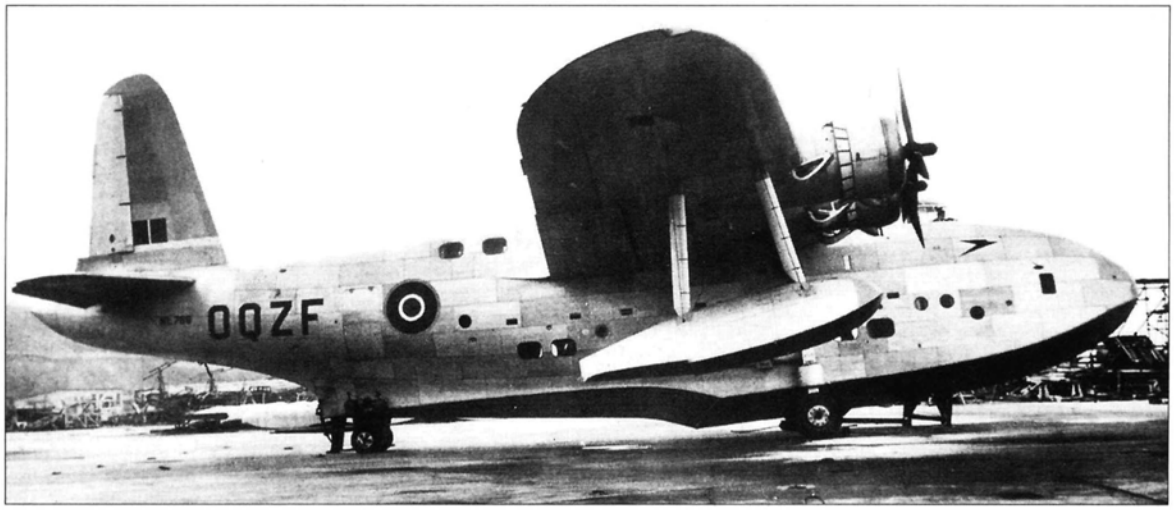
Today, the AMA recognizes five pylon events—Sport 1, 2 and 3, Quickie 500 and Formula I—plus FAI. Some are highly specialized and little flown; others are entry-level; and of course, there's Formula I and FAI. They're all great fun!

Pylon racing has involved so many cute happenings. There was the guy who, after crossing the finish line, did a vertical victory roll and then watched his model power-dive into the concrete. To add insult to injury, he then heard officials say someone else had won with one more point! The tales go on and on; there is excitement and fun in pylon racing like nowhere else. Do remember: don't miss the next heat and always turn left!

NAME THAT PLANE

Can you identify this aircraft?

Send your answer to *Model Airplane News*, **Name that Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606 USA.



Our March mystery plane was correctly identified by John Emerson of Bend, OR, as the prototype D.H. 113, the two-seat night-fighter version of the de Havilland Vampire. Congratulations to John for spotting the distinctive broad windscreen that hints at the side-by-side arrangement of the two-place cockpit. The Vampire was designed around the de Havilland Goblin turbojet, thus dictating the twin-boom configuration. The night fighter (designated the NF. 10 by Britain's RAF) also incorporated a full radar system. Of interest to modelers is that the fuselage used a three-layer ply/balsa/ply sandwich structure similar to what is used in some large-scale models.

The winner will be chosen, four weeks following publication, from correct answers received (delivered by U.S. mail) and will be awarded a free, one-year subscription to *Model Airplane News*. If already a subscriber, the winner will be given a free, one-year subscription extension.

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EVENTS

"T.O.C. OF MARYLAND– 2001" will not be held this year so that we can host the Mason/Dixon Aerobatic Challenge IMAC competition, June 1, 2 and 3, 2001. Food, raffles, prizes, free-style demos. For more info, contact: Andy Kane, (301) 236-9222, or Art Vail, artvail@aerols.com. [7/01]

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Advertisers

Giant *giant-scale models in the U.K.*

In Britain, giant-scale models regularly exceed the 55-pound weight limit that is imposed here in the states. You may ask how it is possible to fly such large aircraft at public events without problems with insurance and the full-scale aviation authorities. The answer is relatively simple. In Britain, the definition of what constitutes a "large" model is the result of a joint effort of interested modelers and the Civil Aviation Authority (CAA), which is basically the same as the U.S.'s FAA. Several years ago, a group of modelers formed a non-competitive organization to promote the popularity of giant-scale models; it's somewhat similar to the USA's IMAA (International Model Aircraft Association) and QSAA (Quarter Scale Association of America). Britain's giant-scale model group is called the "Large Model Association" (LMA).

The LMA produced a detailed, well-thought-out set of structural, electronic, flight and safety regulations specifically for large RC models. This means models weighing more than 20 kilos (44 pounds), though there is no specified weight limit, since LMA safety standards effectively prohibit the flying of unreasonably large aircraft. The LMA also appoints an inspector to approve the construction of a large craft, and the organization must approve any field at which it is tested and flown.

The U.K.'s equivalent of the AMA wasn't interested in adopting the LMA standards, so LMA officials went directly to its government authority, the CAA. The CAA was very receptive to LMA's proposals and soon incorporated its regulations exactly as written into CAA regulations. Every year, pilots of large RC aircraft must apply to the CAA to renew their permits to fly their models (a free service); the CAA has endorsed giant-scale models, so modelers generally don't have a problem gaining a flying permit, and they have the support of various insurance agencies.

Since the LMA's government-approved regulations were generated by its members, non-compliance is rare. Failure to abide by the regulations is a federal offense, and violators can be subject to fines or even imprisonment. This might sound harsh, but it results in wonderful, exciting, 1/5-scale 175-pound four-engine bombers being flown safely and legally at public demonstrations. The LMA/CAA regulations prevent irresponsible and unqualified people from attempting to build and fly potentially dangerous RC models.

All this proves that modeling groups and government agencies can work together for the good of all. Perhaps giant-scale organizations in the U.S. should think about developing a relationship with the FAA.

If we work with our government agencies now, perhaps we'll be able to work out a compromise that will benefit us all, just as has been done in Britain. ✈

Top to bottom: each wing of this 150-pound de Havilland D.H.88 Comet houses two 74cc Zenoah twins and a receiver to actuate aileron, flap and landing gear for each side. • Frans Tangle flies this Sukhoi, which is about 2/3 scale and weighs more than 125 pounds. An Ultralight engine with a 48-inch prop produces good vertical aerobatic performance. • It took John Townsend five years to build this 1/2-scale 150-pound Miles Magister, which is powered by a King 190cc twin spinning a 34x10 prop. • This Grumman F3 F1 biplane is one of two flown in formation by Gunter Viethmeier and Ludwing Faber of Germany. The planes are approximately 1/3 scale and weigh 170 pounds each.